
Seventeen New Species of Lobelioideae (Campanulaceae) from South America

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ABSTRACT. Almost 11% of the 400 unidentified specimens of South American Lobelioideae (Campanulaceae) examined recently cannot be equated with any known species. They are described here as 17 new species: 6 of *Burmeistera*, 6 of *Centropogon*, and 5 of *Siphocampylus*. Several are characterized by morphological characters or combinations of characters that are unique or unusual in their respective genera or in the subfamily as a whole. Six of the novelties are endemic to Ecuador, four to Peru, three each to Venezuela and Colombia, and one to Bolivia.

Key words: *Burmeistera*, Campanulaceae, *Centropogon*, Lobelioideae, *Siphocampylus*, South America.

The neotropical endemics *Burmeistera* Triana, *Centropogon* C. Presl, and *Siphocampylus* Pohl are the largest genera of Lobelioideae (Campanulaceae) after cosmopolitan *Lobelia* L. Together, these three closely related genera (Pepper et al., 1997; Lammers, 1998a; Buss et al., 2001) comprise well over 500 species, found from southern Mexico to northern Argentina and in the West Indies, with their greatest diversity in high-elevation habitats of the Andes. All are large robust plants (herbaceous or suffruticose perennials, shrubs, subshrubs, lianas, and woody rosette plants), with large flowers (corollas averaging 30–60 mm long) borne singly in the axils of the upper leaves or aggregated into terminal foliose or bracteate inflorescences (racemes, corymbs, umbels); the corolla tube is neither fenestrate nor cleft dorsally and if the lobes are dimorphic, it is the dorsal pair that is larger (Lammers, 1998a, in press a, in press b).

Between 1990 and 1997, I examined approximately 750 specimens of neotropical Lobelioideae that had been sent to me for identification (Lammers, 1997); 28 of these (3.7%) could not be equated with known species and were described as 19 new species (Lammers, 1993, 1998a). At that time, I indicated that several hundred additional specimens remained to be identified; 400 of these have now been studied. Of these, 43 (10.8%) could not

be referred to any known species. They are here described as 17 species new to science: 6 in *Burmeistera*, 6 in *Centropogon*, and 5 in *Siphocampylus*. With these additions, the 3 genera collectively total 545 species.

The incredible diversity evident from the foregoing discussion merits some comment. Altogether, 1150 specimens of neotropical lobelioids were examined over the past decade. Of these, 6.2% or 1 out of every 16 specimens sent to me for identification represented a species previously unknown to science. Furthermore, many of these novelties possess features or combinations of features that are unique or unusual (Lammers, 1997, 1998a). Among those described here, for example, *Burmeistera arbusculifera* is the first species of its genus with arbusculiform hairs and *B. fimbriata* the first with a fimbriate leaf margin, while *B. brighamoides* and *B. hippobromoides* have flowers far longer than any of their congeners. *Centropogon candidatus* is unique in its combination of two character states rare within the group: white arbusculiform trichomes and pinnately lobed leaves. Similarly, *Siphocampylus ambivalens* is the first species in the subfamily to combine an umbellate inflorescence with whorled leaves, *S. prevaricator* the first to combine an umbel with arbusculiform trichomes, while *S. plegmatocaulis* is unique in its dimorphic twining stems and dimorphic trichomes surrounding the orifice of the anther tube.

My experience is by no means unique. A generation ago, one of the foremost students of Lobelioideae, Rogers McVaugh (b. 1909), described many new species of South American Lobelioideae on the basis of specimens sent to him with requests for identification. Several (e.g., *Burmeistera pteridioides* McVaugh, *Centropogon varicus* McVaugh) were characterized by unique features or combinations of features. He commented that “almost every mountain in the Andes seems to have different species [of Lobelioideae] on it . . . a host of new and puzzling things turn up in every new collection from the Andes, and it is apparent that there is still a lifetime of work for someone interested in these

bizarre and beautiful plants" (McVaugh, 1965: 400).

McVaugh's quote is as true today as it was 35 years ago. Diversity in these genera is far from exhausted, and further exploration of the Andes will continue to yield new species of *Burmeistera*, *Centropogon*, and *Siphocampylus* for many years to come. Furthermore, if these genera are at all representative of the neotropical flora as a whole, it is clear that a very significant proportion of the biotic diversity of that region remains to be named and described.

I. *Burmeistera* Triana, Nuev. Jen. Esp. 13. 1855.

TYPE: *Burmeistera ibaguensis* Triana.

With the addition of the 6 novelties described here, *Burmeistera* comprises 102 species, distributed from Guatemala to Peru (Lammers, 1998a; Lammers & Maas, 1998). The genus may be distinguished from *Centropogon* and *Siphocampylus* by its combination of usually ebracteolate pedicels, green or yellow corolla often suffused with maroon or purple, large falcate or reflexed dorsal corolla lobes, the wide open orifice of the anther tube, baccate often inflated fruit, and oblong to fusiform seeds much longer than broad. The genus was divided into two sections by Wimmer (1932, 1943, 1968): *Burmeistera* ("Imberbes," nom. invalid.), with all five anthers sparsely soft-hairy or glabrous at apex; and *Barbatae* F. E. Wimmer, with the ventral pair of anthers densely bearded at apex.

I. *Burmeistera arbusculifera* Lammers, sp. nov. TYPE: Ecuador. Carchi: Espejo, El Gualtal, Cerro Golondrinas Hembra, 00°51'N, 78°08'W, bosque muy húmedo montano bajo, bosque alto dominado por *Clusia*, árboles de 25 m de altura, 2800 m, 21 Aug. 1994, W. Palacios & J. Clark 12465 (holotype, OSH; isotypes, MO, QCNE not seen). Figure 1.

Ab omnibus caeteris speciebus *Burmeisterae* indumento trichomatum arbusculiformium differt; species sect. *Barbatarum* affinis *B. asperae*, sed ab hac specie hypanthio obconico 3.5–5 mm diametro basi cuneato, calycis lobis longioribus 7–11 mm longis, corolla breviora 30 mm longa cum tubo 15 mm longo sed ventralibus lobis 10–11 mm longis, et dorsalibus antheris brevioribus 4.2 mm longis distinguenda.

Hemiepiphytic liana; stems moderately leafy, 1.8–2.2 mm diam. toward apex, up to 26 mm diam. at base, branched, sparsely to moderately pubescent with arbusculiform trichomes toward the apex, scabrid (through abrasion of these trichomes) below; latex cream-colored. Lamina ovate, 2.3–5.5 × 1.1–2.8 cm, subcoriaceous; adaxial surface dull

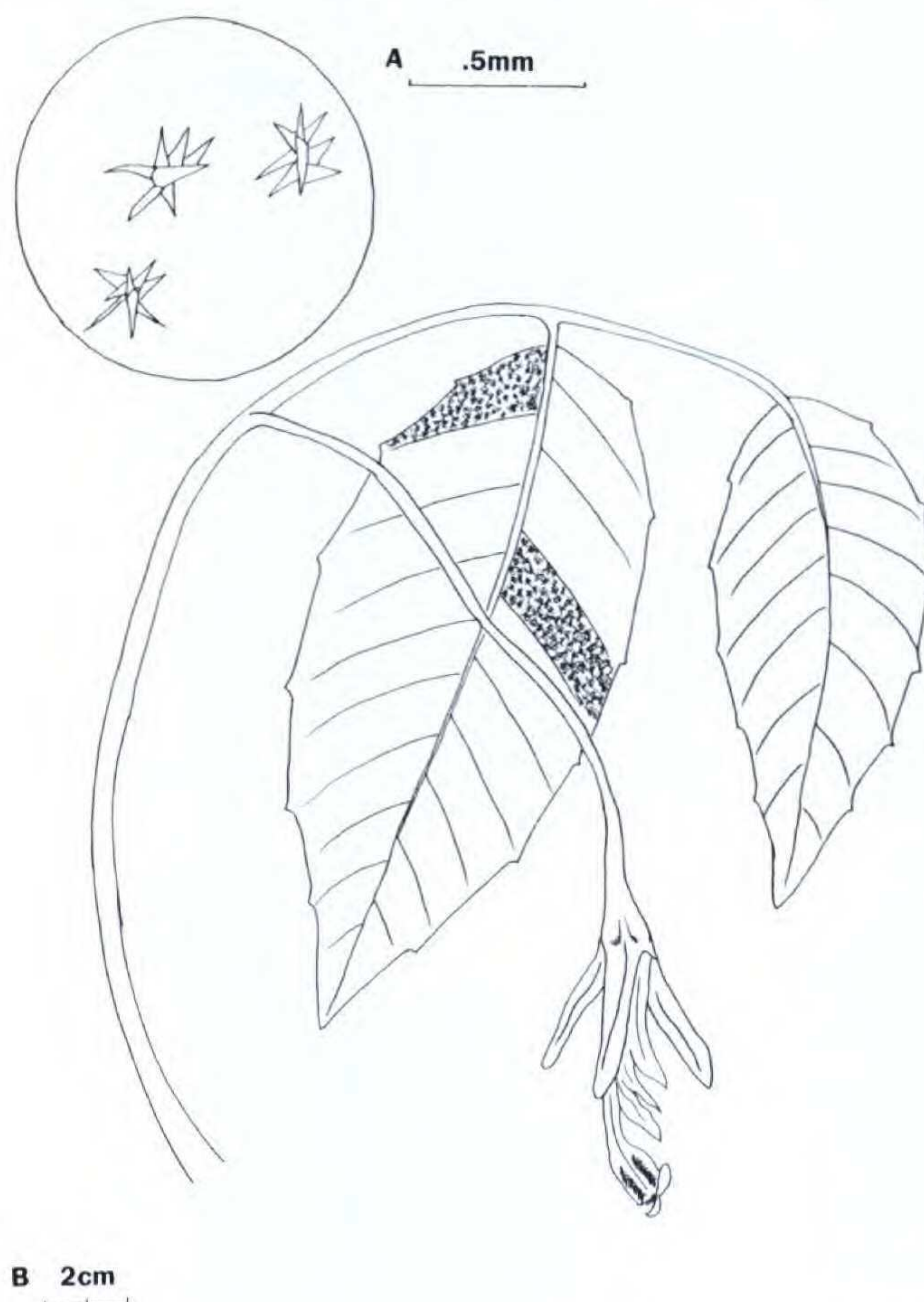


Figure 1. *Burmeistera arbusculifera* Lammers. —A. Arbusculiform trichomes on abaxial leaf surface. —B. Upper portion of stem with flower. (Drawn from the holotype, Palacios & Clark 12465.)

dark green, glabrous; abaxial surface dull green-white, pubescent especially on the veins with arbusculiform trichomes; margin somewhat revolute, denticulate with remote dark callosities; apex acuminate; base rounded or obtuse; petiole 5–10 mm long, 0.6–1.3 mm diam., 1/4–1/7 as long as the lamina, pubescent with arbusculiform trichomes. Flowers solitary in the upper leaf axils; pedicels straight or somewhat curved, ascending, 17–29 mm long, 0.6–0.8 mm diam., ebracteolate, glabrous. Hypanthium obconic, 6–9 mm long, 3.5–5 mm diam., 1/5–1/3 as long as the corolla, glabrous; base cuneate, distinct from pedicel. Calyx lobes lanceolate, ascending, 7–11 × 2–3.5 mm, as long as the hypanthium up to half again as long, 1/2–3/4 as long as the corolla tube, glabrous; apex acute; margin denticulate with 3 dark callosities on each side. Corolla bilabiate, pale green irregularly blotched with purple, 30 mm long, glabrous; tube suberect, 15 mm long, 6 mm diam. at base, gradually tapering to 3 mm diam. at middle and mouth; dorsal lobes lanceolate, falcate, 15 × 3.5 mm, as long as the tube, the apex acute; lateral lobes ovate, deflexed, 11 × 5–5.5 mm, the apex acute; ventral lobe 10 × 5.5 mm, the apex acute. Staminal column exerted between the dorsal lobes; filament

tube suberect, 29 mm long, 1.7 mm diam. at mouth of corolla, flaring to 3 mm diam. at base of anther tube, glabrous; anther tube 3.2 mm diam., slightly deflexed, its surfaces glabrous; dorsal anthers 4.2 mm long, 1/7 as long as the filament tube; ventral anthers 2.8 mm long, their apex sparsely pubescent with soft wispy hairs 0.5 mm long. Fruit and seeds not seen, but apex of ovary flat.

Distribution, habitat, and phenology. Apparently endemic to northern Ecuador, collected twice in the Cerro Golondrinas of Carchi. Growing in wet mossy upper montane forests at elevations of 2750–2800 m, and flowering during July and August. According to Brad Boyle (pers. comm.), the paratype was collected in a sheltered forested cove between ridges. The canopy was 15–18 m tall and consisted of *Weinmannia* (Cunoniaceae), *Miconia* (Melastomataceae), *Clusia* (Clusiaceae), Myrsinaceae, and Lauraceae, while the shrub layer comprised a variety of Melastomataceae and Rubiaceae.

Etymology. The specific epithet alludes to the distinctive branched trichomes; from the Latin noun *arbusculae*, little trees, and the adjectival suffix *-fer*, to bear.

Relationships. Arbusculiform or dendritic hairs (i.e., trichomes irregularly branched above a stalked base) characterize *Centropogon* sect. *Siphocampyloides* and section *Niveopsis* (see below), and also occur in four species of *Siphocampylus* (one described herein) and one species of the endemic Hawaiian genus *Cyanea* Gaudichaud (Lammers, 1998a, 1998b). However, these unusual trichomes have not previously been reported from species currently assigned to *Burmeistera*. Although Wimmer's (1943) monograph did include three species of *Burmeistera* with arbusculiform hairs [*B. asteriscus* F. E. Wimmer, *B. macrocarpa* (Zahlbruckner) F. E. Wimmer, and *B. peruviana* F. E. Wimmer], McVaugh (1949) later transferred them to *Centropogon*.

On the basis of the pubescent apex of its ventral anthers, *B. arbusculifera* is assigned to *Burmeistera* sect. *Barbatae*. In Jeppesen's (1981) treatment of Ecuadorean *Burmeistera*, *B. arbusculifera* keys readily to *B. aspera* F. E. Wimmer, a poorly known species of that section that occurs in nearby Imbabura as well as in southern Colombia. The two species are similar in habit; size, shape, and other details of their leaves; length of pedicels; shape and margin of the calyx lobes; and pigmentation of the corolla. However, *B. aspera* differs from the new species in having the upper portions of the stem and the abaxial leaf surface pubescent with distally curved articulate hairs (vs. arbusculiform hairs in

B. arbusculifera); hypanthium subglobose, 5–6 mm diam., truncate at base (vs. obconic, 3.5–5 mm diam., cuneate at base); calyx lobes 4–5 mm (vs. 7–11 mm) long; corolla 39 mm (vs. 30 mm) long, with tube 25 mm (vs. 15 mm) long and the lateral and ventral lobes 5–6 mm (vs. 10–11 mm) long; and dorsal anthers 6 mm (vs. 4.2 mm) long. Overall, on the basis of morphology and geographic proximity, *B. aspera* would appear to be the closest known relative of *B. arbusculifera*. The possibility of a developmental relationship between the articulate hairs of the former and the arbusculiform trichomes of the latter is intriguing and merits further study.

Paratypes. ECUADOR. **Carchi:** Cerro Golondrinas, valley bottom ca. 1.5 km NNE of summit, transect 2750–2, 00°51'N, 78°08'W, mossy upper montane forest, with tall trees to 30 m high near creek margin, stunted elfin forest on ridge crest, 2750 m, 25 July 1994, *B. Boyle, A. Boyle, J. Bradford & N. Skinner 3451* (MO, OSH, QCNE not seen).

2. *Burmeistera brighamioides* Lammers, sp. nov. TYPE: Ecuador. Carchi: further ascent of Río Verde past stream and waterfall entering from SW and continuing beyond principal drainage stream of large Cerro Golondrinas into drainage streams of medium Golondrinas mountains, 00°52'N, 78°07'W, forest area at stream embankment above stream and forest area, terminating at main stream division, 1200 m, 1 Dec. 1987, *W. S. Hoover 2182* (holotype, MO). Figure 2.

Species insignis egregie distincta ab omnibus caeteris speciebus *Burmeisterae* corolla longissima 78 mm longa duplo vel triplo longiore speciebus generis cognitis cum tubo gracili decempro longiore quam latiore et calycis lobis ad marginem ciliatis cum trichomatibus isabellinis.

Suffruticose herb, 2 m tall; stems moderately leafy, 7 mm diam., the portions seen unbranched, glabrous; latex white. Lamina obovate, 10.5–21 × 5.2–11 cm, chartaceous; adaxial surface dull green, glabrous; abaxial surface dull white-green, pubescent along the veins with sordid yellow trichomes; margin minutely denticulate with remote dark callosities; apex rounded with a small acute tip; base cuneate; petiole 12–35 mm long, 1.5–3.5 mm diam., 1/5–1/10 as long as the lamina, glabrous. Flowers solitary in the upper leaf axils; pedicels straight, ascending, 62 mm long, 1.4 mm diam., ebracteolate, glabrous. Hypanthium oblate, 8 mm long, 9 mm diam., 1/10 as long as the corolla, glabrous; base truncate. Calyx lobes deltate, erect, 2.5–3 × 2.5 mm, ca. 1/3 as long as the hypanthium and 1/20 as long as the corolla tube; apex obtuse;

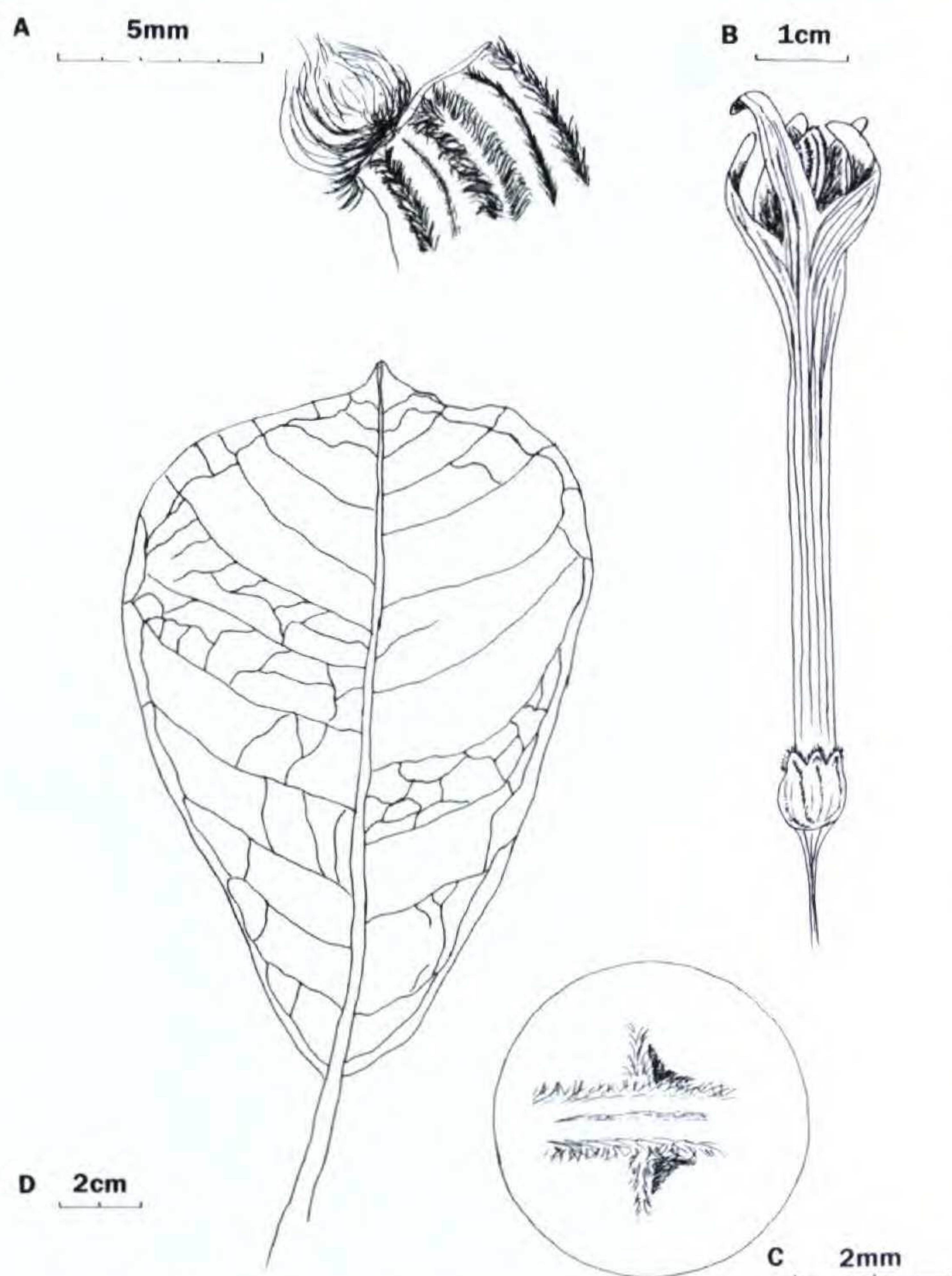


Figure 2. *Burmeistera brighamioides* Lammers. —A. Orifice of anther tube. —B. Flower. —C. Pubescence along abaxial midrib. —D. Leaf. (Drawn from the holotype, Hoover 2182.)

margin entire, densely ciliate with sordid yellow trichomes. Corolla tubular, bilabiate, green, 78 mm long, glabrous; tube suberect, 58 mm long, 5.5 mm diam. at base and middle, very gradually tapering to 8 mm diam. at mouth; dorsal lobes lanceolate, falcate, 20×4.5 mm, $1/3$ as long as the tube, the apex acuminate; ventral lobes ovate, deflexed, 8×4 mm, the apex acuminate. Staminal column slightly exerted between the dorsal lobes; filament tube suberect, 64 mm long, 3 mm diam., glabrous; anther tube 4.5 mm diam., slightly deflexed, densely pubescent on the sutures with long spreading sordid yellow hairs; dorsal anthers 9 mm long, $1/7$ as long as the filament tube; ventral anthers 7 mm long, with dense apical tufts of sordid yellow hairs 1.6–1.8 mm long. Fruit and seeds not seen, but apex of ovary flat.

Distribution, habitat, and phenology. Apparently endemic to northern Ecuador and known only from the type specimen.

Etymology. The specific epithet calls attention to the uncanny resemblance of the long slender flower and obovate leaf to those of the endemic Hawaiian genus *Brighamia* A. Gray (cf. Lammers, 1989).

Relationships. *Burmeistera brighamioides* differs from all previously known members of the genus in the incredible length of its corolla (but see below). Most congeners have corollas between 25 and 35 mm long; reported extremes are as little as 12 mm in *B. kirkbridei* Wilbur and as much as 45 mm in *B. utleyi* Wilbur. At 78 mm, the corolla of *B. brighamioides* is two to three times longer than the average congener. Furthermore, the tube of the corolla is extremely slender, about 10 times longer than broad, lacking basal or apical distensions, and is three times longer than the dorsal lobes; corolla tubes elsewhere in the genus are typically two to seven times longer than broad, distended at base and/or throat, and about as long as the dorsal lobes or up to twice as long. The dense edging of sordid yellow trichomes on the margin of the calyx lobes also appears to be unique within the genus.

On the basis of its densely bearded ventral anthers, *B. brighamioides* would be assigned to *Burmeistera* sect. *Barbatae*. Beyond that, it is not possible to infer a close relationship to any previously described species (but see below). In Jeppesen's (1981) treatment, it keys with difficulty to *B. ceratocarpa* H. Karsten of western Colombia and northern Ecuador (including Carchi), which shares with it an obovate, basally truncate hypanthium. However, that species differs in having leaves widest at or below the middle, longer (13–16 mm) linear glabrous calyx lobes, and shorter (5–6 mm) dorsal anthers, as well as by its far shorter (20–25 mm) corolla with basally distended tube 4–7 times longer than wide and about as long as the lobes.

3. *Burmeistera fimbriata* Lammers, sp. nov.
TYPE: Colombia. Huila: W slope of Cordillera Oriental, 29 km above (SE of) Guadalupe on road to Florencia, ca. 1.5 km W of Caquetá Dept. limit, $01^{\circ}55'N$, $75^{\circ}43'W$, 2250–2350 m, 22 Mar. 1986, B. A. Stein 3706 (holotype, MO). Figure 3.

Ab omnibus caeteris speciebus *Burmeisterae* foliorum marginibus fimbriatis differt; species sect. *Barbatarum* ob pedicellos bibracteolatos et calycis lobos basi connatos affinis *B. venezuelensi*, sed ab hac specie lamina elliptica basi attenuata, bracteolis longioribus 8–9 mm longis, hypanthio obconico, calycis lobis longioribus 26–30 mm longis distinguenda.

Fleshy herb to 1 m tall; stems moderately leafy, 6–6.5 mm diam., the portions seen unbranched, densely pubescent with long crisped septate trichomes; latex white. Lamina elliptic, $12\text{--}23 \times 4.5\text{--}8.8$ cm; adaxial surface dull green, sparsely pubescent with long crisped septate trichomes; abaxial surface dull white-green, sparsely pubescent with

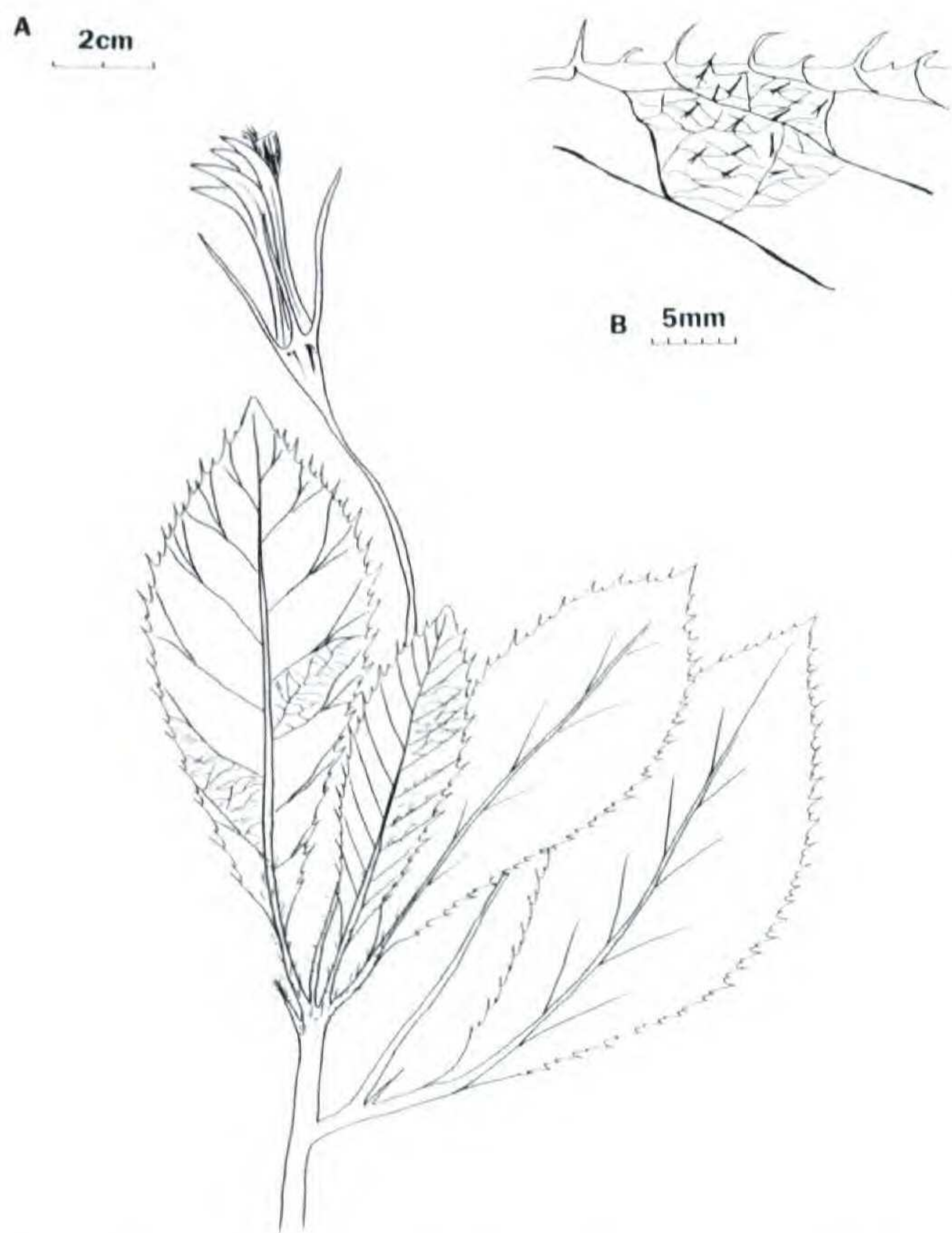


Figure 3. *Burmeistera fimbriata* Lammers. —A. Upper portion of stem with flower. —B. Leaf margin. (Drawn from the holotype, Stein 3706.)

long crisped septate trichomes; margin fimbriate with 4 to 8 fimbriae per cm, the fimbriae a mixture of short (0.8–1.5 mm long) and long (2.5–3.4 mm long) and each pubescent with long crisped septate trichomes; apex cuspidate; base attenuate; petiole 20–40 mm long, 1.8–2.2 mm diam., 1/5–1/8 as long as the lamina, pubescent with long crisped septate trichomes. Flowers solitary in the upper leaf axils; pedicels straight, ascending, 110–125 mm long, 1.2–1.3 mm diam., bibracteolate at base, pubescent with long crisped septate trichomes; bracteoles linear, 8–9 × 0.5 mm, the apex acuminate. Hypanthium obconic, 14 mm long, 9 mm diam., 1/3 as long as the corolla, pubescent with long crisped septate trichomes; base cuneate. Calyx lobes linear-triangular, erect or spreading slightly, 26–30 × 3 mm, about twice as long as the hypanthium and equaling the corolla tube, connate at base for 1–2 mm, pubescent with long crisped septate trichomes; apex acuminate; margin sparsely dentate with 6 to 10 long callosities on each side. Corolla bilabiate, green, 45 mm long, glabrous; tube suberect, 30 mm long, 9 mm diam. at base, gradually tapering to 4.5 mm diam. at middle before gradually increasing to 12 mm diam. at mouth; dorsal lobes triangular, falcate, 15 × 5 mm, half as long as the tube, the apex acuminate; lateral lobes triangular, deflexed, 13 × 6 mm, the apex acuminate. Staminal column slight-

ly exerted between the dorsal lobes; filament tube suberect, 36 mm long; anther tube 5 mm diam., gently deflexed, its surfaces glabrous; dorsal anthers 10 mm long, ca. 1/4 as long as the filament tube; ventral anthers 8 mm long, their apex densely bearded with sordid hairs 1.5 mm long. Fruit and seeds not seen, but apex of ovary flat.

Distribution, habitat, and phenology. Apparently endemic to the western slope of the Cordillera Oriental in southwestern Colombia, and known only from the type specimen.

Etymology. The specific epithet alludes to the distinctive leaf margin; from the Latin adjective *fimbriatus*, fringed.

Relationships. On the basis of its densely bearded ventral anthers, *Burmeistera fimbriata* is referable to section *Barbatae*. Its fimbriate leaf margin is unique in the genus and thus not helpful in assessing relationships more precisely. However, its bibracteolate pedicels and basally connate calyx lobes, while unusual, are not unique. These features are found in two other members of section *Barbatae*: *B. caldasensis* (Gleason) F. E. Wimmer of west-central Colombia and *B. venezuelensis* Lammers of southwestern Venezuela. Like *B. fimbriata*, these two species are fleshy understory herbs up to 1 m tall with toothed calyx lobes equaling or exceeding the hypanthium. Based on these similarities, it seems clear that *B. caldasensis*, *B. fimbriata*, and *B. venezuelensis* form a close-knit if not monophyletic group of species.

Of the two previously described species, *B. venezuelensis* seems more similar to the novelty, resembling it in its septate trichomes, large leaves (lamina 8.5–11.5 × 4.5–6.8 cm), and long pedicels (80–135 mm). In contrast, the other previously described species, *B. caldasensis*, bears only unicellular trichomes and has smaller leaves (lamina 4.5–6.5 × 2–2.5 cm) and shorter pedicels (4 cm long). However, *B. caldasensis* does resemble the novelty in its longer bracteoles (8 mm long) and obconic hypanthium; *B. venezuelensis* has bracteoles just 2.7–4 mm long and an oblate hypanthium.

4. *Burmeistera hippobromoides* Lammers, sp. nov. TYPE: Colombia. Valle: Yatacué, CVC camp at Anchicaya, 03°40'N, 76°50'W, mature premontane wet forest, 700–900 m, 25 Feb. 1983, A. Gentry, A. Juncosa & F. Gomez 40746 (holotype, MO). Figure 4.

Species *Burmeisterae* sect. *Barbatarum* ob corollam gracilem longissimam affinis *B. brighamioidei*, sed ab hac specie laminis oblanceolatis angustioribus 3.8–4.4 cm latis, hypanthio obconico angustiore 5 mm diametro basi cu-

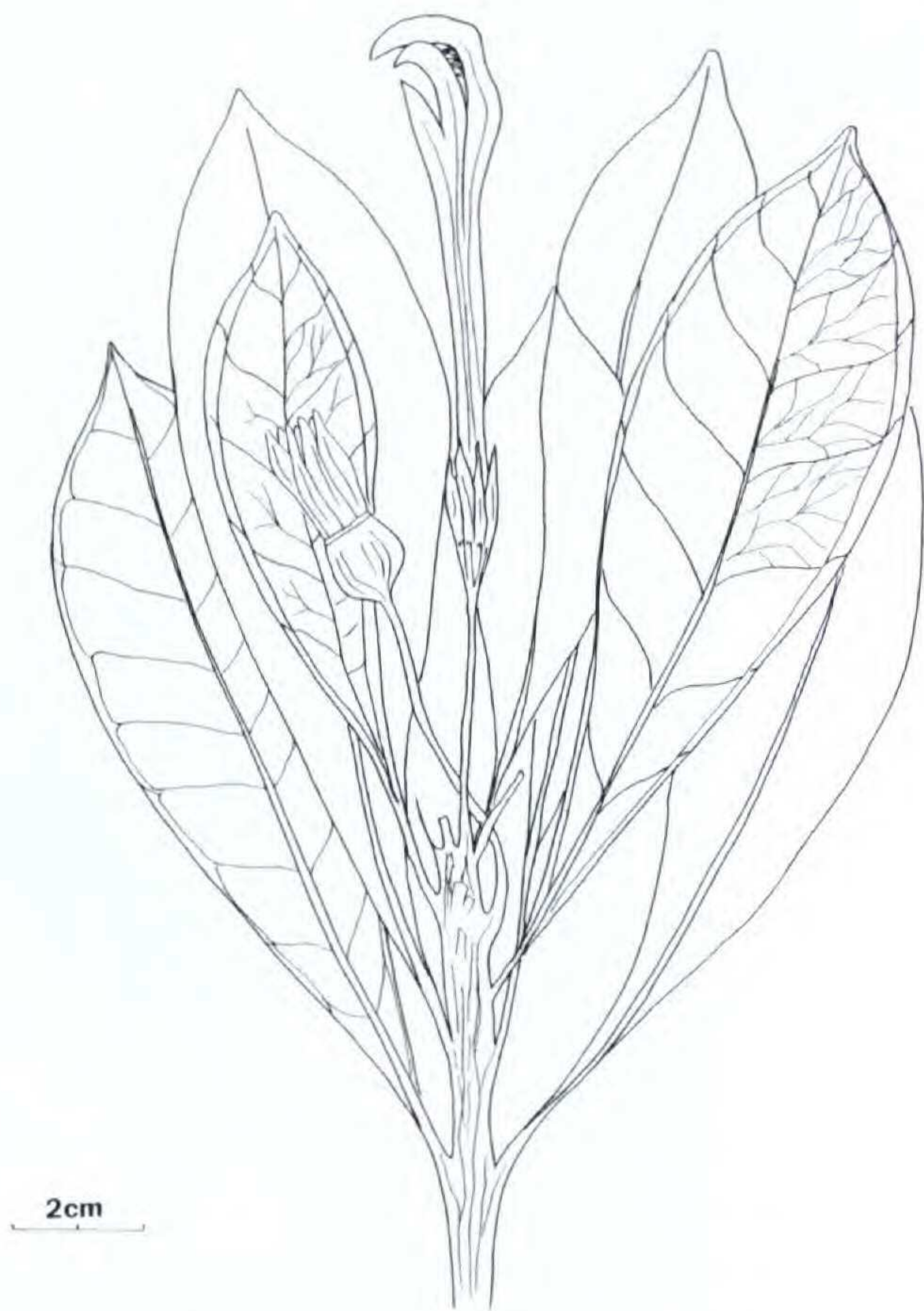


Figure 4. *Burmeistera hippobromoides* Lammers. (Drawn from the holotype, Gentry et al. 40746).

neato, calycis lobis lanceolatis vel anguste triangularis longioribus 13.5–16 mm longis ad marginem glabris, et corolla pubescenti longiore 92 mm longa statim distinguenda.

Shrub, 2 m tall; stems moderately leafy, 9 mm diam., the portions seen unbranched, sparsely short-pubescent. Lamina oblanceolate, 12–15 × 3.8–4.4 cm; adaxial surface dark green, glabrous; abaxial surface green, sparsely short-pubescent; margin subentire, somewhat sinuate; apex acute or cuspidate; base attenuate; petiole 10–18 mm long, 1.5–1.9 mm diam., 1/8–1/12 as long as the lamina, sparsely short-pubescent. Flowers solitary in the upper leaf axils; pedicels straight, ascending, 35–60 mm long, 1.4–1.5 mm diam., ebracteolate, sparsely short-pubescent. Hypanthium obconic, 9 mm long, 5 mm diam., 1/10 as long as the corolla, sparsely short-pubescent; base cuneate. Calyx lobes lanceolate or narrowly triangular, erect, 13.5–16 × 2–3.5 mm, ca. 1 1/2× as long as the hypanthium and 1/4–1/5 as long as the corolla tube; apex acuminate; margin entire. Corolla tubular, bilabiate, green, 92 mm long, densely short-pubescent; tube suberect, 67 mm long, 4.5 mm diam. at base and middle, very gradually tapering to 8 mm diam. at mouth; dorsal lobes lanceolate or narrowly triangular, falcate, 25 × 4–4.5 mm, ca. 1/3 as long as the tube, the apex acuminate; lateral lobes narrowly triangular, falcate, 18 × 3–3.5 mm, the apex

acuminate; ventral lobe narrowly triangular, deflexed, 10 × 4.5 mm, the apex acuminate. Staminal column slightly exerted between the dorsal lobes; filament tube suberect, 77 mm long; anther tube 5 mm diam., slightly deflexed; dorsal anthers 9 mm long, ca. 1/8 as long as the filament tube; ventral anthers with dense apical tufts of white curly hairs 2 mm long. Berry globose, 12 mm diam.; seeds oblong, 0.8 mm long, 0.3 mm diam., honey brown, the testa minutely reticulate.

Distribution, habitat, and phenology. Apparently endemic to the Cordillera Occidental of southwestern Colombia and known only from the type specimen.

Etymology. It seems appropriate to christen the only two species of *Burmeistera* with long slender flowers with the names of the only two genera in the subfamily with long slender flowers. Just as *B. brighamioides* takes its name from the Hawaiian endemic *Brighamia*, this novelty takes its name from the Jamaican endemic *Hippobroma* G. Don.

Relationships. The discovery of one species of *Burmeistera* with inordinately long flowers, *B. brighamioides*, was quite remarkable. The discovery of a second species with such flowers taxes credulity. Like Ecuadorean *B. brighamioides* (see above), *B. hippobromoides* of Colombia differs from all other known members of the genus in bearing a corolla two to three times longer than the average congener, with a slender tube that is almost three times longer than the dorsal lobes and lacks basal or apical distensions. The two species are also similar in length and posture of their pedicels, diameter of the corolla tube, size and shape of the corolla lobes, and size and apical pubescence of the anther tube. Both are members of *Burmeistera* sect. *Barbatae*.

However, the Colombian novelty differs from *B. brighamioides* in a number of features. The leaves of *B. hippobromoides* are oblanceolate (vs. obovate in *B. brighamioides*) and narrower (3.8–4.4 cm wide vs. 5.2–11 cm). The hypanthium is obconic (vs. broadly ovoid) and narrower (5 mm diam. vs. 9 mm), with a cuneate (vs. truncate) base. The calyx lobes are lanceolate or narrowly triangular (vs. deltate) and far longer (13.5–16 mm vs. 2.5–3 mm), and the margin lacks the dense edging of sordid yellow trichomes seen in *B. brighamioides*. The corolla is even longer than that of *B. brighamioides* (92 mm vs. 78 mm), and densely short-pubescent (vs. glabrous).

In light of the unique corolla they share, it seems reasonable to regard *B. brighamioides* and *B. hippobromoides* as sister-species, i.e., to hypothesize that their unique floral morphology has evolved just



Figure 5. *Burmeistera knaphusii* Lammers. (Drawn from the holotype, Hoover 2276.)

once in the genus. One is further tempted to hypothesize that this extraordinary shift in corolla morphology is correlated with a shift in pollen vector. Unfortunately, almost nothing is known about pollination in *Burmeistera*. Vogel (1969) documented chiropterophily in *B. fuscoapicata* F. E. Wimmer, while Luteyn (1986) suggested that *B. pinnatisecta* Luteyn was hummingbird pollinated. Conceivably, the long slender straight corollas of *B. brighamoides* and *B. hippobromoides* could be an adaptation to pollination by hawkmoths (Lepidoptera: Sphingidae), a syndrome hypothesized for both *Brighamia* and *Hippobroma* (cf. Lammers, 1989).

5. *Burmeistera knaphusii* Lammers, sp. nov.

TYPE: Ecuador. Carchi: mountain E & NE, forest area along slope of mountain ENE of Rafael Quindí's mountain *finca* and above Río Verde including top of mountain which is similar in geologic format to Golondrinas Mountains, 00°52'N, 78°07'W, 1870–2400 m, 3 Dec. 1987, W. S. Hoover 2276 (holotype, MO). Figure 5.

Species *Burmeisterae* sect. *Barbatarum* affinis *B. huacamayensi*, sed ab hac specie septatis trichomatibus longiusculis patentibus in caulibus pedicellisque, laminis ovatis vel anguste ovatis brevioribus 2.5–5 cm longis apice acuminatis basi rotundis vel truncatis, pedicellis brevioribus 10–12 mm longis, et floribus parvioribus cum hypanthio 3.5–4 mm longo, corolla 29–32 mm longa, corollae tubo 3–3.8 mm basi diametro, et lobis ventralibus 4.5–6 mm longis distinguenda.

Hemiepiphytic liana to 4 m long; stems moderately leafy, 1.4–2.2 mm diam., the portions seen unbranched, pubescent with long spreading septate trichomes. Lamina ovate or narrowly ovate, 2.5–5 × 1.2–2.2 cm, subcoriaceous; adaxial surface dull green, glabrous; abaxial surface dull pale green, pubescent primarily on the veins with long spreading septate trichomes; margin minutely crenulate with remote callosities, a pair toward the apex especially prominent; apex acuminate; base rounded or truncate; petiole 2–3.5 mm long, 0.5 mm diam., 1/12–1/20 as long as the lamina, pubescent with long spreading septate trichomes. Flowers solitary in the upper leaf axils; pedicels straight or somewhat curved, ascending, 10–12 mm long, 0.5–0.6 mm diam., ebracteolate, pubescent with long spreading septate trichomes, at least at base. Hypanthium obconic, 3.5–4 mm long, 1.8–3 mm diam., 1/8 as long as the corolla, glabrous or with a few scattered long spreading septate trichomes; base cuneate, ± distinct from pedicel. Calyx lobes narrowly triangular or linear-triangular, reflexed, 4–6 × 0.7–1.3 mm, as long as the hypanthium up to half again as long, 1/5–1/3 as long as the corolla tube, glabrous or with a few scattered long spreading septate trichomes; apex acute; margin denticulate with 2–3 callosities on each side. Corolla bilabiate, pale green faintly suffused with lavender or red, 29–32 mm long, glabrous; tube suberect, 19–21 mm long, 3–3.8 mm diam. at base, gradually tapering to 2.2–3 mm diam. at middle and 2.8–3.6 mm diam. at mouth; dorsal lobes lanceolate, spreading, 10–12 × 3–3.7 mm, 1/2–3/5 as long as the tube, the apex acuminate; lateral lobes ovate, deflexed, 5–6 × 2.2–3.5 mm, the apex acuminate; ventral lobe 4.5–5 × 1.8–2.6 mm, the apex acuminate. Staminal column slightly exerted between the dorsal lobes; filament tube suberect, 24–28 mm long, 0.8–1.1 mm diam. at mouth of corolla, flaring to 1.3–1.5 mm diam. at base of anther tube, glabrous; anther tube 2.5–3 mm diam., deflexed, its surfaces glabrous; dorsal anthers 3.2–4.5 mm long, 1/5–1/10 as long as the filament tube; ventral anthers 2.2–3 mm long, their apex sparsely pubescent with soft wispy hairs 0.2–0.4 mm long. Fruit and seeds not seen, but apex of ovary flat.

Distribution, habitat, and phenology. Apparently endemic to northern Ecuador, collected twice in the Cerro Golondrinas of Carchi. Growing in montane forests at elevations of 1870–2430 m, and flowering during December.

Etymology. This species is respectfully dedicated to the memory of George Knaphus (1924–2000), botanist and educator extraordinaire. From

1965 until his death, "Dr. K." was professor of botany at Iowa State University. In classroom, laboratory, and field, he opened the eyes of thousands of undergraduate students to the marvels of the plant and fungal kingdoms. Furthermore, his personal approach to academic advising and genial sponsorship of Botany Club (with colleague Lois H. Tiffany) provided a level of support, guidance, and encouragement to young men and women that is rare indeed in today's academic world. The epithet coined here is in accordance with Recommendation 60C.2 of the *International Code of Botanical Nomenclature* (ICBN; Greuter et al., 2000). Although his surname resembles a second declension Latin noun, it is actually of Norwegian origin; the initial *k* is pronounced and *ph* is not a digraph.

Relationships. On the basis of its apically pubescent ventral anthers, *Burmeistera knaphusii* is assigned to section *Barbatae*. In Jeppesen's (1981) treatment, it keys with difficulty to *B. huacamayensis* Jeppesen, a member of that section endemic to the Cordillera de Huacamayos in the Ecuadorean province of Napo. The two species share a number of features, including habit; hypanthium shape; size, shape, and reflexion of the calyx lobes; color and shape of the corolla; and various aspects of the staminal column. However, *B. huacamayensis* differs from the novelty in its lack of hairs on stems and pedicels, longer (9–12 cm vs. 2.5–5 cm in *B. knaphusii*) lanceolate (vs. ovate or narrowly ovate) leaves that are cuspidate (vs. acuminate) at apex and cuneate or obtuse (vs. rounded or truncate) at base; longer (6–7 cm vs. 1–1.2 cm) pedicels; and generally larger flowers, with the hypanthium 5–6 mm long and corolla 37 mm long with the tube 6 mm in diameter at base and the ventral lobes 9 mm long. Overall, *B. huacamayensis* would appear to be the closest known relative of *B. knaphusii*.

Paratype. ECUADOR. **Carchi:** forest and ridge area above Río Verde and ridge flanking medium Cerro Golondrinas, 00°52'N, 78°07'W, 2070–2430 m, 4 Dec. 1987, W. S. Hoover 2322 (MO).

6. *Burmeistera smaragdi* Lammers, sp. nov.
TYPE: Ecuador. Esmeraldas: Quinindé, Bilsa Biological Station, Montañas de Mache, 35 km W of Quinindé, 5 km W of Santa Isabel, road between the station and the SE Ridge Trail, 00°21'N, 79°44'W, premontane wet forest, 400–600 m, 19 Sep. 1994, M. S. Bass & N. Pittman 22 (holotype, OSH; isotypes, MO, QCNE not seen). Figure 6.

Species *Burmeisterae* sect. *Burmeisterae* affinis *B. glabratae* et *B. truncatae*, sed ab his speciebus petiolis brevioribus 3–7 mm longis, foliorum apice caudato, hypan-



Figure 6. *Burmeistera smaragdi* Lammers. (Drawn from the holotype, Bass & Pittman 22.)

thio anguste obconico basi attenuato, corolla brevior 24–30 mm longa, dorsalibus antheris brevioribus 6–7 mm longis basi crinito in suturis, et antheris omnibus ad apicem glabris distinguenda.

Scandent shrub, 0.5–1 m tall; stems moderately leafy, 1.3–2 mm diam., the portions seen unbranched, glabrous; latex white. Lamina narrowly elliptic or narrowly oblong, 6.5–12.5 × 2–4.2 cm, chartaceous; adaxial surface dull olive green, glabrous; abaxial surface dull white-green, the midrib pubescent with long septate hairs; margin subentire or minutely denticulate with remote tiny dark callosities; apex caudate; base cuneate; petiole 3–7 mm long, 0.6–0.8 mm diam., 1/12–1/20 as long as the lamina, pubescent with long septate hairs. Flowers solitary in the upper leaf axils; pedicels straight, ascending, 37–66 mm long, 0.8–1.4 mm diam., ebracteolate, glabrous. Hypanthium narrowly obconic, 6–11 mm long, 4.5–5.5 mm diam., 1/4–2/5 as long as the corolla, glabrous; base cuneate, tapering imperceptibly into the pedicel. Calyx lobes narrowly triangular or linear-triangular, straight, ascending or spreading, 12–19 × 1–2.5 mm, 2–3 times as long as the hypanthium, equaling to 3/4 again as long as the corolla tube, glabrous; apex acuminate; margin minutely denticulate with 3 to 5 tiny dark callosities on each side. Corolla bilabiate, green or cream-colored, often tinged or striate with maroon or purple, 24–30 mm long, glabrous; tube

suberect, 11.5–13 mm long, 3.5–4 mm diam. at the abruptly inflated base, 2.3–2.5 mm diam. at middle, gradually flaring to 2.5–3.3 mm diam. at mouth; dorsal lobes lanceolate, falcate, 12–18.5 × 2.3–4 mm, about as long as the tube to 2/3 again as long, the apex acuminate; lateral lobes lanceolate, deflexed, 8–13 × 2.2–3 mm, the apex acuminate; ventral lobe 6.5–11.5 × 2.2–3 mm, the apex acuminate. Staminal column exerted between the dorsal lobes; filament tube suberect, 21–21.5 mm long, 1.2–1.3 mm diam. at mouth of corolla, flaring to 2.7–3 mm diam. at base of anther tube, glabrous; anther tube 3.5–4.5 mm diam., slightly deflexed, pubescent at the base of the dorsal sutures with long crisped hairs, the orifice glabrous; dorsal anthers 6–7 mm long, 1/5–3/10 as long as the filament tube; ventral anthers 3.5–4.5 mm long. Fruit and seeds not seen, but apex of ovary flat.

Distribution, habitat, and phenology. Apparently endemic to northern Ecuador, where it has been collected several times at the Bilsa Biological Station in the Mache Mountains of Esmeraldas. It grows in wet premontane forests at elevations of 400–600 m, and flowers during September.

Etymology. The specific epithet is the genitive of the Latin noun *smaragdus*, emerald, in reference to the Ecuadorean province to which the species is apparently endemic.

Relationships. With its glabrous anther tube orifice, *Burmeistera smaragdi* is referable to section *Burmeistera*. In Jeppesen's (1981) treatment, it keys to two species of that section: *B. glabrata* (Kunth) Bentham & Hooker ex B. D. Jackson, which is found from central Colombia to southeastern Ecuador; and *B. truncata* Zahlbruckner, endemic to the Ecuadorean province of Pichincha. These three species share a number of features, including general size and shape of their leaves, pedicels shorter than the subtending leaf, erect or spreading calyx lobes not overlapping at base and longer than both the hypanthium and corolla tube, and glabrous green corollas often suffused with darker hues. However, *B. glabrata* and *B. truncata* differ from *B. smaragdi* in their longer petioles (1–2 cm vs. 0.3–0.7 cm in *B. smaragdi*); acute or acuminate (vs. caudate) leaf apices; globose, urceolate, or semi-ovoid hypanthium rounded or obtuse at base (vs. narrowly obconic and attenuate at base); corolla 30–37 mm long (vs. 24–30 mm long); and anther tube glabrous on the surface (vs. pubescent at base of dorsal sutures) and villous at the apex (vs. glabrous), with the dorsal three 8–10 mm long (vs. 6–7 mm long). Overall, *B. smaragdi* seems most closely related to *B. glabrata* and *B. truncata*.

Paratypes. ECUADOR. **Esmeraldas:** Quinindé, Bilsa Biological Station, Montañas de Mache, 20 km NW of Quinindé and 3 km W of Santa Isabela, southern boundary, SW of cabin, 00°22'N, 79°45'W, premontane wet forest, open area, 600 m, 24 Sep. 1994, *J. R. Abbott 15243* (MO, QCNE not seen); Quinindé, Bilsa Biological Station, Mache Mountains, 35 km W of Quinindé, 5 km W of Santa Isabel, 00°21'N, 79°44'W, premontane wet forest, on edge of clear cut and mature forest, 400–600 m, 13 Sep. 1994, *J. L. Clark & B. Adnepos 27* (MO, OSH, QCNE not seen); Quinindé Cantón, Mache-Chindul Ecological Reserve, Bilsa Biological Station, Mache mountains, 35 km W of Quinindé, 5 km W of Santa Isabel, 00°21'N, 79°44'W, premontane wet forest, 500 m, 24 Sep. 1996, *J. L. Clark 2902* (MO, OSH, QCNE not seen).

II. *Centropogon* C. Presl, Prodr. Monogr. Lobel. 48. 1836. TYPE (lectotype, designated by Pfeiffer (1873: 650)): *Lobelia surinamensis* L. [= *Centropogon cornutus* (L.) Druce].

With the addition of the six novelties described here, *Centropogon* comprises 222 species, distributed from southern Mexico to Bolivia and Brazil and in the Lesser Antilles (Lammers, 1998a). The genus differs from *Burmeistera* and resembles *Siphocampylus* in its usually bibracteolate pedicels; commonly red, orange or yellow (sometimes green or white) corolla; the occluded orifice of the anther tube; and isodiametric seeds. *Centropogon* and *Siphocampylus* are distinguished on the basis of fruit type: baccate, from a flat-topped ovary, in *Centropogon*; capsular, from an ovary conical at apex, in *Siphocampylus*.

Centropogon has been divided (Lammers, 1998a) into five sections primarily on the basis of floral morphology and pubescence: *Centropogon*, *Siphocampyloides* Bentham (divided into subsects. *Brevilimbati* F. E. Wimmer and *Peruviani* McVaugh), *Wimmeriopsis* McVaugh (divided into subsects. *Falcata* McVaugh and *Colombiani* McVaugh), *Burmeisteroides* Gleason, and *Niveopsis* Lammers. A key to these taxa is provided by Lammers (1998a), and their salient features are summarized here.

Three major types of gross floral morphology may be recognized in *Centropogon*: (1) “short-lobed”—corolla tube 3–8 times longer than broad and 2–5 times longer than the triangular or oblong lobes; (2) “long-lobed”—corolla tube 3–8 times longer than broad and about as long as the triangular or oblong lobes; and (3) “stout”—corolla tube twice as long as broad and four times longer than the deltate lobes. The “short-lobed” corolla type characterizes section *Centropogon*, section *Wimmeriopsis*, and subsection *Brevilimbati*; the “long-lobed” corolla type characterizes section *Burmeisteroides* and subsection *Peruviani*; and the “stout” corolla type is unique to section *Niveopsis*.



Figure 7. *Centropogon beniteziae* Lammers. (Drawn from the holotype, Luteyn & Cotton 9709.)

Two types of pubescence are important in the sectional classification of *Centropogon*: the tuft of trichomes at the apex of the ventral pair of anthers, and those forming the indumentum on stems, leaves, hypanthia, calyx lobes, and corollas. In the autonymic section, the apical anther trichomes are conerescent into a distinct triangular scale; these hairs are free and brush- or beard-like in the remaining sections. In section *Siphocampyloides* and section *Niveopsis*, the surface indumentum is composed primarily of arbusculiform (dendritic) trichomes; in the other sections, any hairs that occur are simple (with one exception, described below).

1. *Centropogon beniteziae* Lammers, sp. nov.

TYPE: Venezuela. Trujillo: Dpto. Boconó, Páramo Guaramacál, 20–21 km beyond jct. with hwy. NE of Boconó, 09°13'N, 70°13'W, shaded very wet streambed with large boulders, infrequent, 2640–2700 m, 14 Mar. 1984, *J. L. Luteyn & E. Cotton 9709* (holotype, OSH; isotypes, NY, PORT not seen, VEN not seen). Figure 7.

Species *Centropogonis* subsect. *Brevilimbatorum* affinis *C. elmano* et *C. ewanio*, sed ab his speciebus lamina elliptica, pedicellis longioribus 5.8–12.5 cm longis, et floribus majoribus cum hypanthio 6–8 mm longo 8–10 mm diametro, calycis lobis 12–29 mm longis, corolla 48–60 mm longa tubo 35–45 mm longo ad constrictionem 3–3.8 mm diametro ad orem 7.7–10.5 mm diametro dorsalibus lobis 3–5 mm latis ventralibus lobis 2.8–3.5 mm latis, et tubo antherarum glabro distinguenda.

Erect or scandent suffruticose herb, 0.5–1.5 m tall; stems moderately leafy, 2–3.7 mm diam. above, up to 6 mm diam. below, branched, pubescent with arbusculiform hairs toward apex, glabrate below; latex white. Lamina elliptic or widely elliptic (rarely ovate), 5–15.5 × 2.5–7.7 cm, chartaceous; adaxial surface dull dark green, sparsely pubescent (densest on midrib) with simple or sparingly branched hairs; abaxial surface dull green often suffused with maroon, densely pubescent with arbusculiform hairs; margin denticulate or serrulate with dark callosities; apex acuminate; base cuneate; petiole 10–30 mm long, 0.9–1.5 mm diam., 1/4–1/8 as long as the lamina, pubescent with arbusculiform hairs. Flowers solitary in the upper leaf axils; pedicels ascending, 58–125 mm long, 0.9–1.4 mm diam., bibracteolate at or just above the base, pubescent with arbusculiform hairs. Hypanthium subglobose or very widely depressed globose, 6–8 mm long, 8–10 mm diam., 1/6–1/9 as long as the corolla, pubescent with arbusculiform hairs. Calyx lobes narrowly triangular or linear-triangular, ascending, 12–29 × 1.5–3 mm, half again as long to almost 4 times as long as the hypanthium, 1/3–1/2 as long as the corolla tube, pubescent with arbusculiform hairs; apex acuminate; margin entire or serrulate denticulate with 1 to 5 tiny curved teeth on each side. Corolla tubular, somewhat ventricose, orange, red, or dark red, paler or yellow within, 48–60 mm long, pubescent with arbusculiform hairs; tube suberect, 35–45 mm long, 5–7 mm diam. at the base, narrowing abruptly to 2.5–3.8 mm diam. just above the base, then flaring gradually to 7.5–10.5 mm diam. just below the mouth; dorsal lobes narrowly triangular, falcate, 13–17 × 3–5 mm, ca. 1/3–2/5 as long as the tube, the apex acuminate; ventral lobes lanceolate, deflexed, 9–12 × 2.8–3.5 mm, the apex acuminate. Staminal column somewhat exserted between the dorsal lobes; filament tube suberect, 43–54 mm long, 1–1.4 mm diam., glabrous or sparsely pubescent with simple white crisped hairs; anther tube 2–2.6 mm diam., suberect, its surfaces glabrous; dorsal anthers 7–9 mm long, 1/5–1/7 as long as the filament tube; ventral anthers 6–7 mm long, pubescent at apex with tufts of stiff yellow-white hairs 1.2–1.7 mm long. Berry very widely depressed globose, 8–12 mm long, 12–15 mm diam., the calyx lobes tardily deciduous; seeds ellipsoid, golden brown, 1.4 mm long, 0.4 mm diam., the testa minutely reticulate.

Distribution, habitat, and phenology. Apparently endemic to western Venezuela, where in recent years it has been collected frequently in wet rocky stream-

beds, on steep roadside embankments, and in montane forest and subpáramo habitats in the area around Guaramacál and Boconó in the state of Trujillo, at elevations of 1600–3175 m. Plants flower from late October to July, and bear fruit from April to July.

Etymology. This species is named in honor of Carmen E. Benítez de Rojas (b. 1937) of the Universidad Central de Venezuela in Maracay, curator of the Herbario Victor Manuel Badillo (MY). Dra. Benítez is an authority on the Venezuelan flora, especially Solanaceae, and has been very helpful to me on several occasions in locating material of Venezuelan Lobelioideae. Earlier authors have referred to *C. beniteziae* as “*Centropogon* sp.” (Ortega et al., 1987) and “*Centropogon* sp. A” (Dorr et al., 2000).

Relationships. With its arbusculiform trichomes and “short-lobed” corolla, *Centropogon beniteziae* is clearly a member of section *Siphocampyloides*, subsection *Brevilimbati*. However, it is unusual among the members of that subsection in having at least some simple hairs on the adaxial leaf surface. Most *Brevilimbati* bear only arbusculiform hairs on vegetative surfaces; just two previously known species bear simple hairs on the adaxial leaf surface: *C. ewanii* F. E. Wimmer of western Venezuela and *C. heteropilis* F. E. Wimmer of Colombia. In fact, many of the specimens of *C. beniteziae* cited here were originally identified as *C. ewanii* (cf. Dorr et al., 2000). However, in *C. ewanii* and *C. heteropilis*, all of the hairs on the adaxial surface are strictly simple, while *C. beniteziae* is variable, showing a continuum from simple to sparingly branched hairs, often on a single leaf. Furthermore, these two species collectively differ from *C. beniteziae* in their shorter pedicels (4–6 cm vs. 5.8–12.5 cm in *C. beniteziae*), shorter calyx lobes (4–7 mm vs. 12–29 mm), shorter corollas (35–44 mm vs. 48–60 mm), and pubescent (vs. glabrous) anthers.

Centropogon beniteziae is also quite similar to another western Venezuelan endemic, *C. elmanus* F. E. Wimmer. Both species are suffruticose plants with dark-callose leaf margins, denticulate linear calyx lobes 1.5 to 4 times longer than the depressed globose hypanthium, and constricted orange corollas. However, *C. elmanus* differs in its oblong leaves (vs. elliptic in *C. beniteziae*) bearing only arbusculiform trichomes (vs. some simple hairs adaxially), shorter pedicels (5 cm vs. 5.8–12.5 cm), and smaller flowers. Specifically, the hypanthium of *C. elmanus* is 5 mm long (vs. 6–8 mm in *C. beniteziae*) and 7 mm diam. (vs. 8–10 mm diam.), with calyx lobes 10 mm long (vs. 12–29 mm long) and 1 mm wide (vs. 1.5–3 mm). The corolla is 43–44 mm long (vs. 48–60 mm); its tube 30 mm long (vs.

35–45 mm), 2 mm diam. at the constriction (vs. 2.5–3.8 mm), and 5–6 mm at the mouth (vs. 7.5–10.5 mm); and its lobes 2 mm wide (vs. 3–5 mm in the dorsals, 2.8–3.5 mm in the ventrals). The staminal column is long exerted from the corolla (vs. scarcely exerted) and the anther tube long pilose on the dorsal sutures (vs. glabrous). On the basis of morphology and geography, *C. elmanus* and *C. ewanii* appear to be the closest known relatives of *C. beniteziae*.

Paratypes. VENEZUELA. **Trujillo:** Distr. Boconó, Páramo de Guaramacál, SE of television towers, 09°14'N, 70°11'W, along stream cascading over rocks, 2000 m, 28 Apr. 1988, L. J. Dorr, L. C. Barnett, N. Cuello & G. M. Diggs, Jr. 4987 (PORT); Distr. Boconó, Páramo de Guaramacál, W of road summit, 09°14'N, 70°11'W, 2800–2900 m, 28 Apr. 1988, L. J. Dorr, L. C. Barnett, N. Cuello & G. M. Diggs, Jr. 5015 (NY not seen, PORT); Mun. Boconó, Parque Nacional Guaramacál, road from Boconó to Guaramacál, SE of Boconó, N slope of mountain, 09°13'N, 70°12'W, montane forest, 2550 m, 7 July 1995, L. J. Dorr & L. C. Barnett 8043 (PORT); Mun. Boconó, Parque Nacional Guaramacál, road from Boconó to Guaramacál, SE of Guaramacál, N slope of mountain, 09°13'N, 70°12'W, along stream, 2650 m, 20 July 1995, L. J. Dorr & L. C. Barnett 8180 (F, NY not seen, PORT not seen, US); Mun. Boconó, Parque Nacional Guaramacál, road from Boconó to Guaramacál, SE of Boconó, S slope of mountain, 09°13'N, 70°12'W, montane forest, 2500 m, 22 July 1995, L. J. Dorr & L. C. Barnett 8240 (F, NY not seen, PORT not seen, US); Dpto. Boconó, Parque Nacional Guaramacál, trail from La Laguna de las Aguas Negras to La Qda. Salvaje, N slope of mountain, 09°19'N, 70°11'W, 27 Oct. 1998, L. J. Dorr, E. Briceño, G. Briceño & R. Cracas 8291 (PORT); Mun. Boconó, Parque Nacional Guaramacál, road from Boconó to Guaramacál, SE of Boconó, ca. 15 km from the post of the park guards, S slope of mountain, 09°13'N, 70°12'W, montane and lower montane forest, 3 Nov. 1998, L. J. Dorr, E. Briceño, G. Briceño & R. Cracas 8436 (C not seen, COL not seen, CTES not seen, F, MO not seen, NY not seen, OSH, PORT not seen, US); Mun. Boconó, Parque Nacional Guaramacál, Boconó–caserío de Guaramacal road, S slope, (Qda. Jirajara) from turnoff to antennas to just above El Campamento, 15 June 2001, L. J. Dorr, S. M. Niño & R. Caracas 9014 (OSH); 12 km ESE of Boconó, 1 km N to 4 km NNE of Guaramacál, 09°12'–13'N, 70°09'W, 1600–1900 m, 15 Mar. 1982, R. Liesner, A. González, B. Stergios & G. Aymard 12954 (MO, PORT, VEN not seen); Boconó–Guaramacál road, kms 16–22 SSE of Boconó, subpáramo dominated by *Espeletia partoneoides* and *Neurolepis*, 2775–3175 m, 20 Jan. 1978, J. L. Luteyn, M. Lebrón-Luteyn, L. Ruiz-Teran & J. A. Dugarte 5206 (NY not seen, MERF not seen, OSH, VEN not seen); Dpto. Boconó, Páramo Guaramacál, 12.2 km beyond jct. outside Boconó, 09°13'N, 70°12'W, steep roadside slopes dominated by *Clusia* and bamboo, ca. 2600 m, 19 Jan. 1984, J. L. Luteyn & J. J. Pipoly 9296 (NY not seen, OSH, VEN not seen); Dpto. Boconó, Páramo Guaramacál, 20–21 km beyond jct. with hwy. NE of Boconó, 09°13'N, 70°13'W, shaded very wet streambed with large boulders, 2640–2700 m, 14 Mar. 1984, J. L. Luteyn & E. Cotton 9710 (NY not seen, OSH, PORT not seen, VEN not seen), J. L. Luteyn & E. Cotton 9711 (NY not seen, OSH, PORT not seen, US, VEN not seen); Dpto.

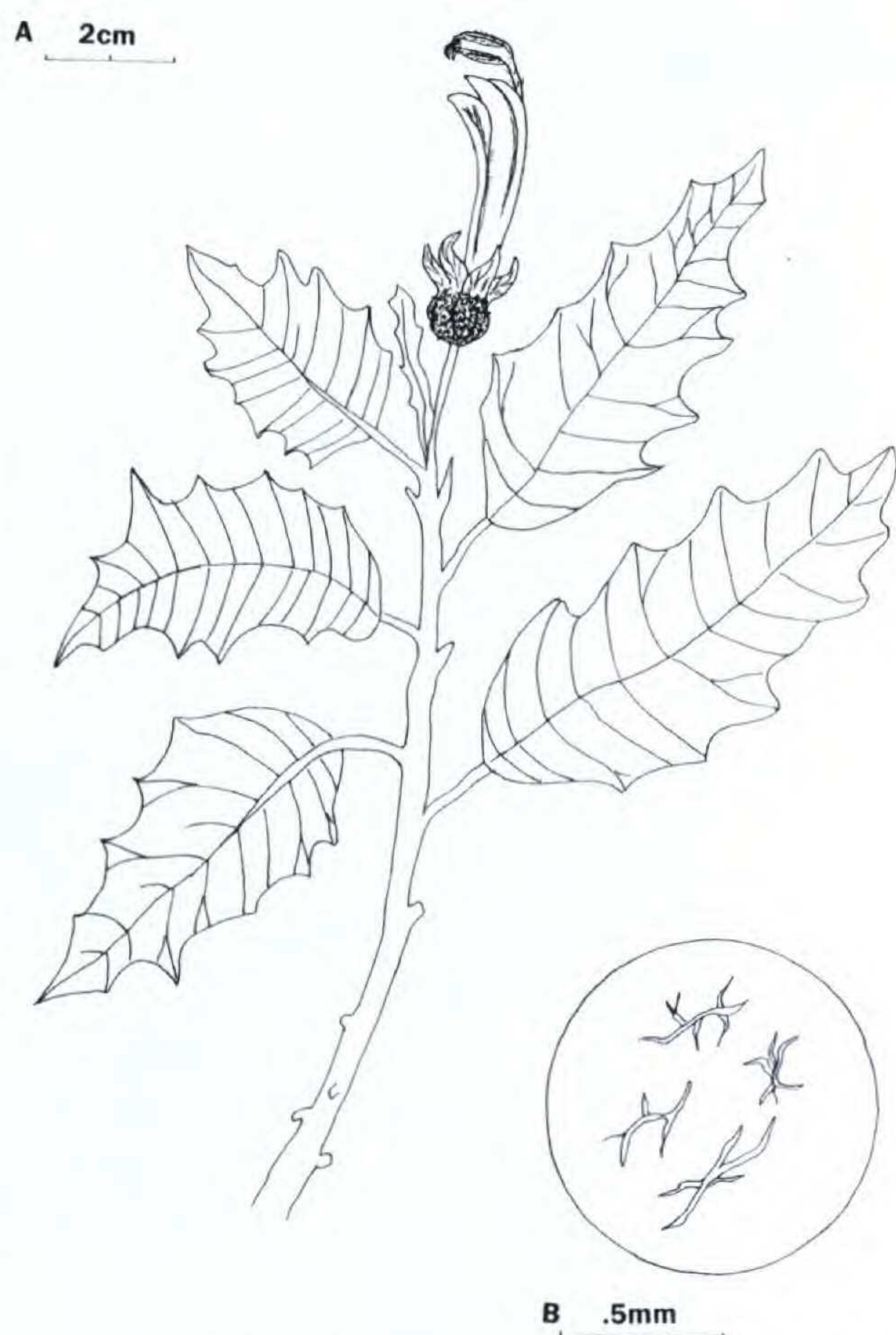


Figure 8. *Centropogon candidatus* Lammers. —A. Upper portion of stem with flower. —B. Arbusculiform trichomes on abaxial leaf surface. (Drawn from the holotype, *Bristol 1182*.)

Carache, via Páramo Cendé sitio denominado "Los Barreales," 9°32'N, 70°08'W, bosque subparameros, 2800–2900 m, 29 Feb. 1988, *R. Rivero & N. Rondón 1576* (MO, PORT not seen); Mun. Boconó, camino al Cerro Guaramacál via la laguna de "Los Cedros," bosque nublado, 21 Mar. 1981, *B. Stergios 2591* (PORT); Cerro Guaramacál, Boconó, bajando hacia el caserío de Guaramacál, selva húmeda montano alto, 25–26 Nov. 1982, *B. Stergios, G. Aymard & A. Smith 4726* (PORT); Mun. Boconó, Parque Nacional Guaramacál, camino Laguna de los Cedros, vertiente norte, 09°07'N, 70°16'W, bosque húmedo montano alto, cresta del páramo, 2000–2400 m, Jan. 1991, *B. Stergios 18643* (PORT not seen, US); Mun. Boconó, camino al Cerro Guaramacál via la laguna de "Los Cedros," bosque nublado, 21 Mar. 1981, *B. Stergios 2591* (PORT).

2. *Centropogon candidatus* Lammers, sp. nov.

TYPE: Colombia. Nariño: E Aponte, Río Majinsanoy, forest trail, 2700 m, 29 June 1963, *M. L. Bristol 1182* (holotype, US). Figure 8.

Species insignis egregie distincta ab omnibus caeteris speciebus *Centropogonis* subsect. *Brevilimbatorum* trichomatibus arbusculiformibus candidis, laminis pinnatilibatis, et calycis lobis ellipticis erectis 13–15 mm longis 5–6 mm latis marginibus 1–3-spinulosis.

Shrub, 3 m tall; stems 2–2.6 mm diam., moderately leafy, densely pubescent with white arbusculiform hairs. Lamina ovate, 6.4–8 cm long, 2.5–3

cm wide between the lobes, 3–3.9 cm wide across the lobes, coriaceous; adaxial surface dull dark green, very sparsely pubescent with white arbusculiform hairs; abaxial surface dull green-white, very densely pubescent with white arbusculiform hairs, the surface almost wholly obscured; margin pinnately lobed, the segments 3 to 5 per side, triangular to deltate, 3–8 × 3–9 mm, acute and mucronate at apex; apex acuminate; base rounded; petiole 14–20 mm long, 1–1.5 mm diam., 1/4–1/5 as long as the lamina, very densely pubescent with white arbusculiform hairs. Flowers solitary in the upper leaf axils; pedicels ascending, 27–35 mm long, 0.8–0.9 mm diam., ebracteolate (or the bracteoles obscured by the indumentum?), very densely pubescent with white arbusculiform hairs. Hypanthium oblate, 6 mm long, 9–10 mm diam., 1/8 as long as the corolla, very densely pubescent with white arbusculiform hairs. Calyx lobes elliptic, erect, 13–15 × 5–6 mm, more than twice as long as the hypanthium, about half as long as the corolla tube, densely pubescent with white arbusculiform hairs toward base, becoming sparser toward apex; apex acuminate; margin denticulate with 1 to 3 spinulose teeth on each side. Corolla tubular, bilabiate, coral pink externally, yellow within, 46–48 mm long, pubescent with white arbusculiform hairs; tube gently curved, 31–32 mm long, 4–4.5 mm diam. at the base, not constricted, flaring gradually to 6.5–8 mm diam. at mouth; dorsal lobes narrowly triangular, falcate, 15–16 × 3.7–4 mm, half as long as the tube, the apex acuminate; ventral lobes narrowly triangular, deflexed, 8–10 × 2.5–3.5 mm, the apex acuminate. Staminal column exerted, emerging above the dorsal lobes; filament tube yellow, slightly curved, 45–47 mm long, 1 mm diam., densely pubescent with long spreading simple white hairs; anther tube gray-blue, 2.3–2.4 mm diam., slightly curved, sparsely pubescent on the connectives with long simple white hairs; dorsal anthers 7 mm long, 1/6 as long as the filament tube; ventral anthers 5 mm long, pubescent at apex with tufts of yellow-white hairs 1.5–2 mm long. Fruit and seeds not seen, but apex of ovary flat.

Distribution, habitat, and phenology. Apparently endemic to the Cordillera Central of southwestern Colombia, and known only from the type specimen.

Etymology. The specific epithet alludes to the plant's dense white indumentum; from the Latin adjective *candidatus*, clothed in white.

Relationships. Based on its arbusculiform trichomes and "short-lobed" corolla, *Centropogon candidatus* is a member of section *Siphocampyloides*, subsection *Brevilimbati*. Within that subsection, however, it is remarkable for its white (pre-

sumably unpigmented) indumentum. The arbusculiform hairs that characterize subsection *Brevilimbati* typically are darkly pigmented: yellow-brown, red-brown, chocolate-brown, purple, gray, or black. Only two other species of that subsection are characterized by white trichomes: *C. albstellatus* Jeppesen and *C. llanganatensis* Jeppesen, both of central Ecuador. Neither is very similar to *C. candidatus* in other features. Taken together, these two species differ from the novelty in their cuneate or attenuate leaf bases (vs. rounded in *C. candidatus*), entire or minutely toothed (vs. lobed) leaf margins, longer pedicels (40–80 mm vs. 27–35 mm), shorter calyx lobes (2–10 mm vs. 13–15 mm), shorter corollas (20–40 mm vs. 46–48 mm long) constricted toward base (vs. not constricted), and glabrous (vs. pubescent) staminal column.

As an aside, it should be noted that while color of the trichomes generally has been useful as a taxonomic character among subsection *Brevilimbati* (Jeppesen, 1981), variation within a species is possible. *Centropogon erythraeus* Drake of southern Ecuador typically has a dense indumentum that is purple or chocolate-brown. Recently, I examined a specimen (Stein & D'Alessandro 2730, MO) from a known locality of *C. erythraeus*, which conformed in every way to that species, except that the pubescence was pure white. Apparently, just as many plants produce occasional individuals with unpigmented flowers, so, too, do some members of subsection *Brevilimbati* occasionally produce individuals with unpigmented trichomes. For this reason, it would not be wise to distinguish a new species solely on an unusual indumentum color.

Fortunately, *Centropogon candidatus* is also remarkable for its pinnately lobed leaf margin. In most of subsection *Brevilimbati*, the margins are entire or minutely toothed (crenulate, denticulate, serrulate). Only one other species has leaves divided into definite lobes: *C. australis* (F. E. Wimmer) Gleason of Venezuela. This species does resemble *C. candidatus* in lamina size, petiole length, hypanthium shape, and pubescence of the staminal column. However, *C. australis* differs from *C. candidatus* in its brown (vs. white) indumentum; calyx lobes that are sublinear (vs. elliptic) and only 1–5 mm long (vs. 13–15 mm); and corolla that is purple (vs. coral externally and yellow internally), only 30–36 mm long (vs. 46–48 mm), and constricted (vs. not constricted) toward base. Overall, these two species do not seem closely related, and it may be hypothesized that leaf-lobing has evolved at least twice in this subsection.

In addition to the white indumentum and lobed leaves, *C. candidatus* is distinctive by virtue of its calyx lobes. In the majority of subsection *Brevilim-*

bati, calyx lobes are only 1–9 mm long (vs. 13–15 mm long in *C. candidatus*) and broadest at base (vs. above the base) with entire margins (vs. 1 to 3 spinulose denticulations per side). However, one known species possesses calyx lobes similar to those of *C. candidatus*: *C. karstenii* Zahlbruckner has calyx lobes that are 12–15 mm long and lanceolate (i.e., broadest above the base), with 3 denticulations on each margin. This species further resembles the novelty in size and general shape of the lamina; length of the pedicels; size and shape of the hypanthium; in the size, exertion, and pubescence of the staminal column; and is likewise endemic to Nariño, growing in the vicinity of Pasto. It differs from the novelty only in its red-brown indumentum (vs. white in *C. candidatus*), shorter petioles (8–10 mm vs. 14–20 mm), denticulate (vs. pinnately lobed) lamina, narrower calyx lobes (2–4 mm vs. 5–6 mm) that are lanceolate (vs. elliptic), and red (vs. coral and yellow) corollas with shorter lobes (dorsal lobes 10 mm vs. 15–16 mm, ventral ones 5 vs. 8–10 mm). Overall, on the basis of morphology and geography, *C. karstenii* would appear to be the closest known relative of *C. candidatus*.

3. *Centropogon eilersii* Lammers & M. O. Dillon, sp. nov. TYPE: Peru. Cuzco: La Convencion, road from Cuzco to Quillabamba, after pass Abra Malaga and before Ipal, 13°04'S, 72°22'W, remnants of former cloud forest along the road, 2600–2900 m, 24 Feb. 2000, M. Weigend & K. Weigend 2000/441 (holotype, NY; isotype, Herbario Universidad Nacional de San Augustin not seen). Figure 9.

Species *Centropogonis* sect. *Burmeisteroidis* affinis *C. david-smithii* et *C. isabellino*, sed ab his speciebus pedicellis longioribus 250 mm longis, calycis lobis longioribus 40 mm longis, corollis luteolis majoribus cum corolla 85 mm longa tubo 50 mm longo, et tubo filamentorum longiore 65 mm longo bene distinguenda.

Apparently an erect suffruticose herb or shrub; stems 8 mm diam., pubescent with brown arachnoid hairs. Lamina elliptic, 28–29 × 9–10.8 cm, chartaceous; adaxial surface dull dark green, pubescent with short stiff white hairs; abaxial surface dull light green, more densely pubescent with long stiff spreading brown hairs; margin minutely denticulate with yellow callosities; apex acute; base cuneate; petiole adaxially canaliculate, 25–38 mm long, 3–3.5 mm diam., 1/7–1/11 as long as the lamina, pubescent with brown arachnoid hairs. Flowers solitary in the upper leaf axils; pedicels ascending, curved, 250 mm long, 2.7 mm diam., bibracteolate at base, moderately pubescent with brown arachnoid hairs; bracteoles linear, 7 × 0.5 mm. Hypanthium narrowly campanulate, 18 mm long, 12 mm

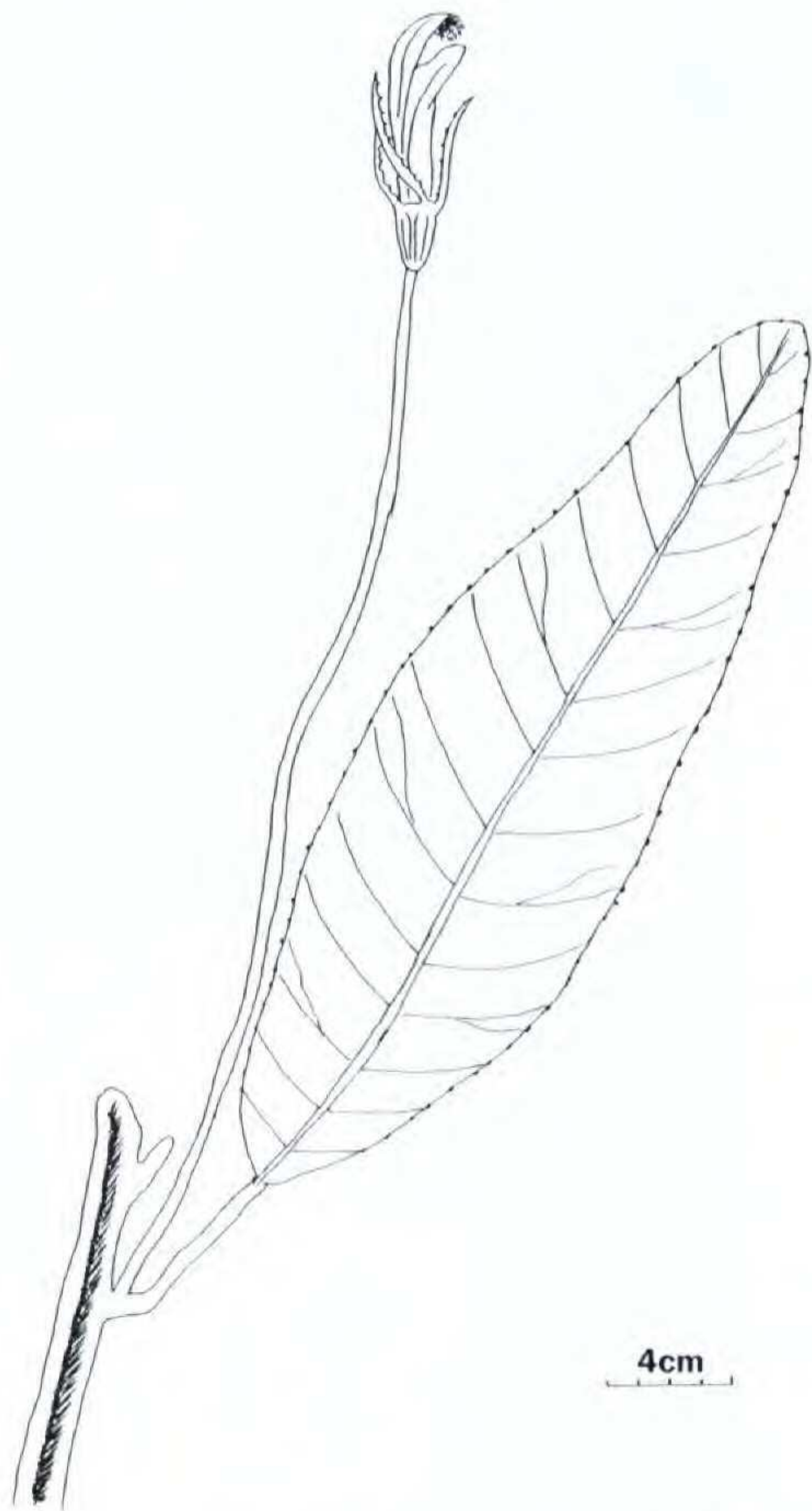


Figure 9. *Centropogon eilersii* Lammers & M. O. Dillon.
(Drawn from the holotype, Weigend & Weigend 2000/441.)

diam., 1/5 as long as the corolla, pubescent with brown arachnoid hairs. Calyx lobes linear-triangular, erect, $40 \times 3\text{--}5$ mm, more than twice as long as the hypanthium, 4/5 as long as the corolla tube, pubescent with brown arachnoid hairs; apex acuminate; margin serrulate with 8 to 12 tiny curved teeth on each side. Corolla tubular, pale yellow, 85 mm long, pubescent with short stiff simple colorless hairs, these often clustered so as to appear stellate; tube slightly curved, 50 mm long, 12 mm diam. at the base, narrowing imperceptibly to 10 mm diam. at middle, then flaring gradually to 22 mm diam. at mouth; dorsal lobes narrowly triangular, falcate, 35×9 mm, 7/10 as long as the tube, the apex acute; ventral lobes narrowly triangular, deflexed, 23×9 mm, the apex acute. Staminal column apparently little exerted from the tube, the anthers positioned between the dorsal lobes; filament tube slightly curved, 65 mm long, 2 mm diam., pubescent with long soft spreading white hairs; anther tube 7 mm diam., curved, densely pubescent with long shaggy brown hairs; dorsal anthers 15 mm long, 1/4–1/5 as long as the filament tube; ventral anthers 13 mm long, pubescent at apex with tufts of soft brown hairs 3.5–4 mm long. Fruit and seeds not seen, but apex of ovary flat.

Distribution, habitat, and phenology. Apparently

endemic to southern Peru, and known only from the type collection.

Etymology. This species is respectfully dedicated to the memory of Lawrence J. Eilers (1927–2000), plant taxonomist, ardent conservationist, and botanical educator. From 1968 to 1989, Larry was professor of biology at the University of Northern Iowa and curator of that school's herbarium (ISTC). His research program focused on the flora of Iowa, and culminated in the publication of *The Vascular Plants of Iowa* (Eilers & Roosa, 1994). As much as Larry enjoyed floristic research, it was as a teacher that he truly excelled. Students who were having trouble with academics or with life in general seemed especially to flourish and blossom under Larry's gentle tutelage. In addition to classroom teaching, he directed the master's theses of several future botanists, including the author and Michael O. Dillon of the Field Museum of Natural History (F), who joins me in naming this species in our professor's honor.

Relationships. On the basis of its simple trichomes and "long-lobed" corolla, *Centropogon eilersii* is a member of section *Burmeisteroides*. Within that section, it belongs to a group of four species characterized by denticulate leaves 2 to 6 times longer than wide; green or yellow corollas; and stiff persistent simple (often clustered) trichomes at least on the corolla (McVaugh, 1949; Lammers, 1998a): *C. altus* F. E. Wimmer of northern Peru, *C. ayavacensis* (Willdenow ex Schultes) Lammers of the Cordillera Central of Colombia (*C. willdenowianus* F. E. Wimmer, nom. superfl.; cf. Lammers, 1999), *C. david-smithii* Lammers of central Peru, and *C. isabellinus* F. E. Wimmer, also found in Cuzco. Among these species, the novelty seems most similar to the last two, particularly in size, shape, and pubescence of the hypanthium and anther tube. *Centropogon david-smithii* and *C. isabellinus* only differ from *C. eilersii* in their shorter pedicels (90–160 mm vs. 250 mm in *C. eilersii*); shorter calyx lobes (7–35 mm vs. 40 mm); green (vs. pale yellow) corollas that are shorter (56–64 mm vs. 85 mm) due to their shorter tube (20–33 mm vs. 50 mm); and shorter filament tube (46–50 mm vs. 65 mm) that is strongly (vs. scarcely) exerted.

4. *Centropogon joergensenii* Lammers, sp. nov.

TYPE: Ecuador. Zamora–Chinchi: Chinchi, Parque Nacional Podocarpus, La Esmeralda (Cooperativa San Francisco de Numbala Alto), $04^{\circ}22'S$, $79^{\circ}03'W$, bosque primario alto, 2250 m, Jan. 1994, W. Palacios & M. Tirado 13042 (holotype, OSH; isotypes, MO, QCNE not seen). Figure 10.

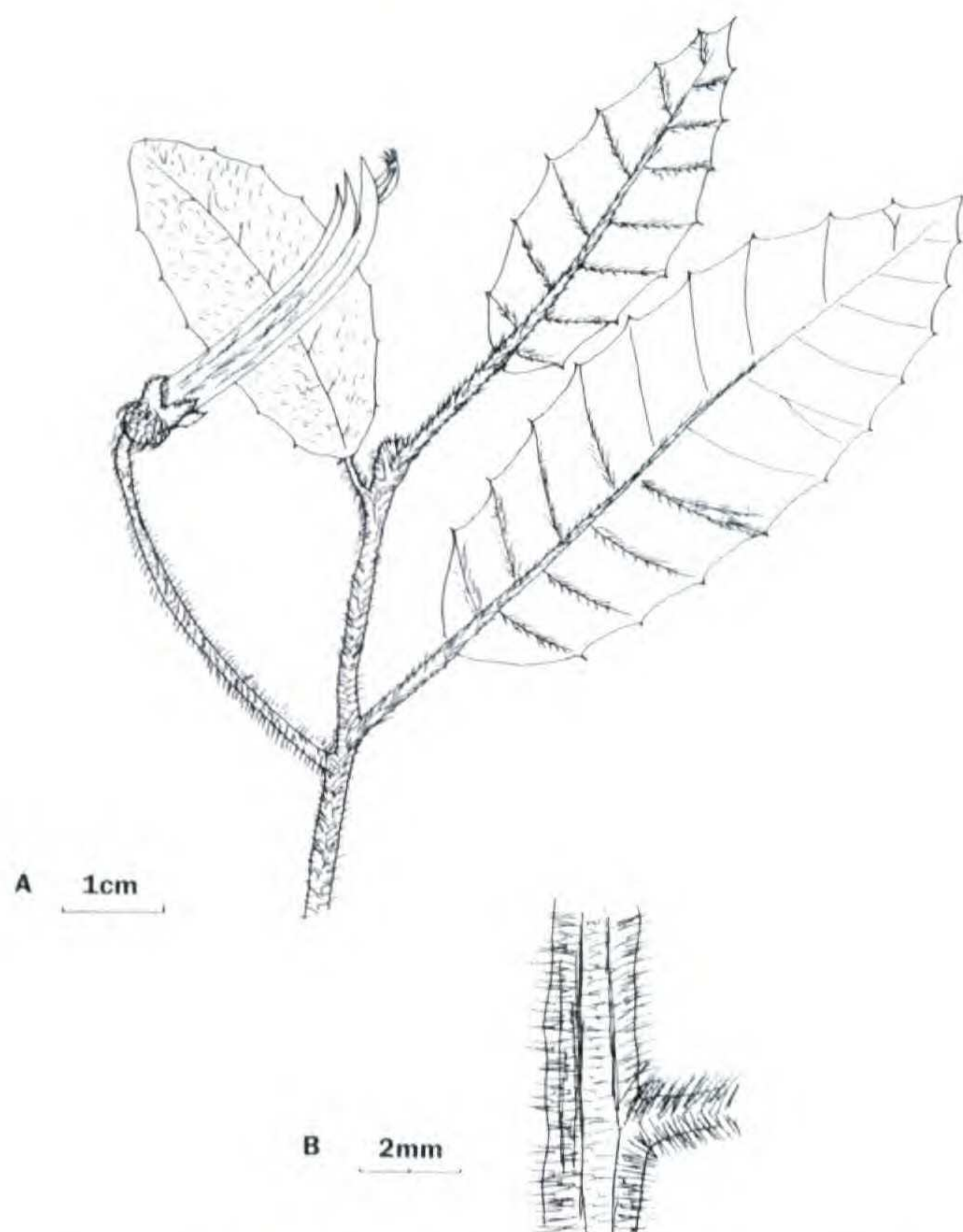


Figure 10. *Centropogon joergensenii* Lammers. —A. Upper portion of stem with flower. —B. Pubescence on stem and petiole. (Drawn from the holotype, Palacios & Tirado 13042.)

Species *Centropogonis* subsect. *Falcatorum* ob trichomata septata longa affinis *C. trichodi*, sed ab hac specie trichomatibus longioribus 2.5–3.5 mm longis, pedicellis longioribus 6.5–7.2 cm longis, calycis lobis parce pubescentibus brevioribus 6–7 mm longis, corolla majore 45–48 mm longa, columna staminali vix exserta, et tubo antherarum glabro statim distinguenda.

Scandent shrub; stems moderately leafy, 2–2.5 mm diam., branched, densely pubescent with stiff yellow spreading multicellular hairs 2.5–3.5 mm long. Lamina elliptic, 5.8–8 × 2.6–3.6 cm, chartaceous; adaxial surface dull dark green, moderately pubescent with long stiff yellow multicellular hairs; abaxial surface dull white-green, densely pubescent with long stiff yellow multicellular hairs; margin denticulate with dark callosities; apex acute; base obtuse; petiole 1.3–1.8 mm long, 0.8–1.2 mm diam., 1/4–1/6 as long as the lamina, densely pubescent with long stiff yellow multicellular hairs. Flowers solitary in the upper leaf axils; pedicels ascending, 65–72 mm long, 1–1.3 mm diam., bibracteolate at or just above the base, moderately pubescent with long stiff spreading yellow multicellular hairs. Hypanthium depressed hemispheric, 3–4 mm long, 7–8 mm diam., 1/10–1/15 as long as the corolla, densely pubescent with long stiff spreading yellow multicellular hairs. Calyx lobes triangular, erect, 6–7 × 2.5–3 mm, half again as long to almost 2 1/2 × as long as the hypanthium,

1/5–1/6 as long as the corolla tube, moderately pubescent with long stiff spreading yellow multicellular hairs; apex acuminate; margin entire. Corolla tubular, slightly ventricose, red with yellow limb, 45–48 mm long, moderately pubescent with long stiff spreading yellow multicellular hairs; tube slightly curved, 40 mm long, 6 mm diam. at the base, narrowing abruptly to 2.5 mm diam. just above the base, then flaring gradually to 5.5 mm diam. just below the mouth; dorsal lobes narrowly triangular, falcate, 8 × 2.3 mm, 1/5 as long as the tube, the apex acuminate; ventral lobes narrowly triangular, deflexed, 7 × 1.8 mm, the apex acuminate. Staminal column slightly exserted between the dorsal lobes; filament tube slightly curved, 43 mm long, 1.5 mm diam., densely pubescent with long soft white hairs; anther tube 2 mm diam., slightly curved, gray, its surfaces glabrous; dorsal anthers 6 mm long, 1/7 as long as the filament tube; ventral anthers 4.5 mm long, pubescent at apex with tufts of stiff dirty-white hairs 0.8–1 mm long. Fruit and seeds not seen, but apex of ovary flat.

Distribution, habitat, and phenology. Apparently endemic to southern Ecuador and known only from the type collection.

Etymology. It is a pleasure to name this species for Peter Møller Jørgensen (b. 1958), from 1986 to 1989 director of the herbarium at Pontificia Universidad Católica del Ecuador (QCA) and since 1992 a member of the curatorial staff at the Missouri Botanical Garden (MO). Peter is actively engaged in studies of the flora and biogeography of the Andes, was co-editor of the encyclopedic *Catalogue of the Vascular Plants of Ecuador* (Jørgensen & León-Yáñez, 1999), and, with his wife Carmen Ulloa Ulloa (see below), is a contributor to the *Flora of Ecuador* project. In forming the epithet, the spelling of his surname has been altered to comply with Article 60.6 of the ICBN (Greuter et al., 2000).

Relationships. On the basis of its simple trichomes and “short-lobed” corolla with deflexed falcate lobes, *Centropogon joergensenii* is a member of section *Wimmeriopsis*, subsection *Falcati*. Though I did not comment upon it in my earlier review of the genus (Lammers, 1998a), the species of subsection *Falcati* fall into two discrete geographic groups. The first includes four species endemic to Costa Rica [*C. irazuensis* Wilbur, *C. palmanus* (Donnell Smith) F. E. Wimmer, *C. valerii* Standley, and *C. wimmeri* Standley] plus a fifth one [*C. grandidentatus* (Schlechtendal) Zahlbruckner] that is distributed from southern Mexico to northern Colombia and western Venezuela. The second group includes 12 Ecuadorean endemics [*C. aequitorialis*

F. E. Wimmer, *C. brachysiphoniatus* Zahlbruckner, *C. calycinus* Benthams, *C. jeppesenii* Lammers, *C. phoeniceus* Jeppesen, *C. pilalensis* Jeppesen, *C. rimbachii* F. E. Wimmer, *C. rubrodentatus* Jeppesen, *C. sodiroanus* Zahlbruckner, *C. subandinus* Zahlbruckner, *C. trichodes* F. E. Wimmer, and *C. uncinatus* Zahlbruckner] plus one [*C. reticulatus* Drake] that occurs in both Ecuador and northern Peru.

The new species differs from all these in various features, most notably in the dense indumentum of very long stiff yellow multicellular trichomes; most of the species are glabrous or pubescent with shorter, softer, unicellular hairs. Only *C. trichodes* F. E. Wimmer, which is also endemic to Zamora-Chinchipe (valley of the Río Valladolid), bears trichomes at all similar to those of *C. joergensenii*; they are, however, only 1–1.5 mm long (vs. 2.5–3.5 mm long in *C. joergensenii*). While the two species are similar in size and shape of the leaves and general floral structure, *C. trichodes* differs in its shorter pedicels (4–6 cm vs. 6.5–7.2 cm in *C. joergensenii*), longer calyx lobes (8–15 mm vs. 6–7 mm) that are subglabrous (vs. moderately pubescent), shorter corolla (30–35 mm vs. 45–48 mm), strongly exerted (vs. scarcely exerted) staminal column, and anther tube pilose with purple-blue trichomes in the sutures (vs. glabrous). On the basis of morphology and geography, *C. trichodes* appears to be the closest known relative of *C. joergensenii*.

5. *Centropogon ulloae* Lammers, sp. nov.

TYPE: Ecuador. Napo: road from Tulcán to Santa Bárbara and La Bonita, 21 km below Santa Bárbara, 00°35–45'S, 77°30'W, cloud forest, 2400 m, 28 May 1985, B. A. Stein 2875 (holotype, MO). Figure 11.

Ab omnibus caeteris speciebus *Centropogonis* sect. *Wimmeriopsisidis* indumento sparso trichomatum arbusculiformium minimorum differt; species ob calycis lobos basi connatos hypanthio oblato longiores affinis *Centropogoni calycino* et speciebus similaribus, sed ab his speciebus lamina lanceolata vel anguste elliptica longiore 12.5–17.5 cm longa, calycis lobis connatis per dimidium longitudinis ad apicem obtusis vel rotundatis ad marginem integris, et corolla aurantiaco-rubra cum lobis luteis bene distinguenda.

Shrub forming thickets to 2.5 m tall; stems purple, somewhat densely leafy toward apex, 3 mm diam., subglabrous; latex white. Lamina lanceolate or narrowly elliptic, 12.5–17.5 × 4–4.6 cm, subcoriaceous; adaxial surface dull dark green, very sparsely scabrid with minute arbusculiform trichomes; abaxial surface dull white-green, sparsely scabrid with minute arbusculiform trichomes; mar-

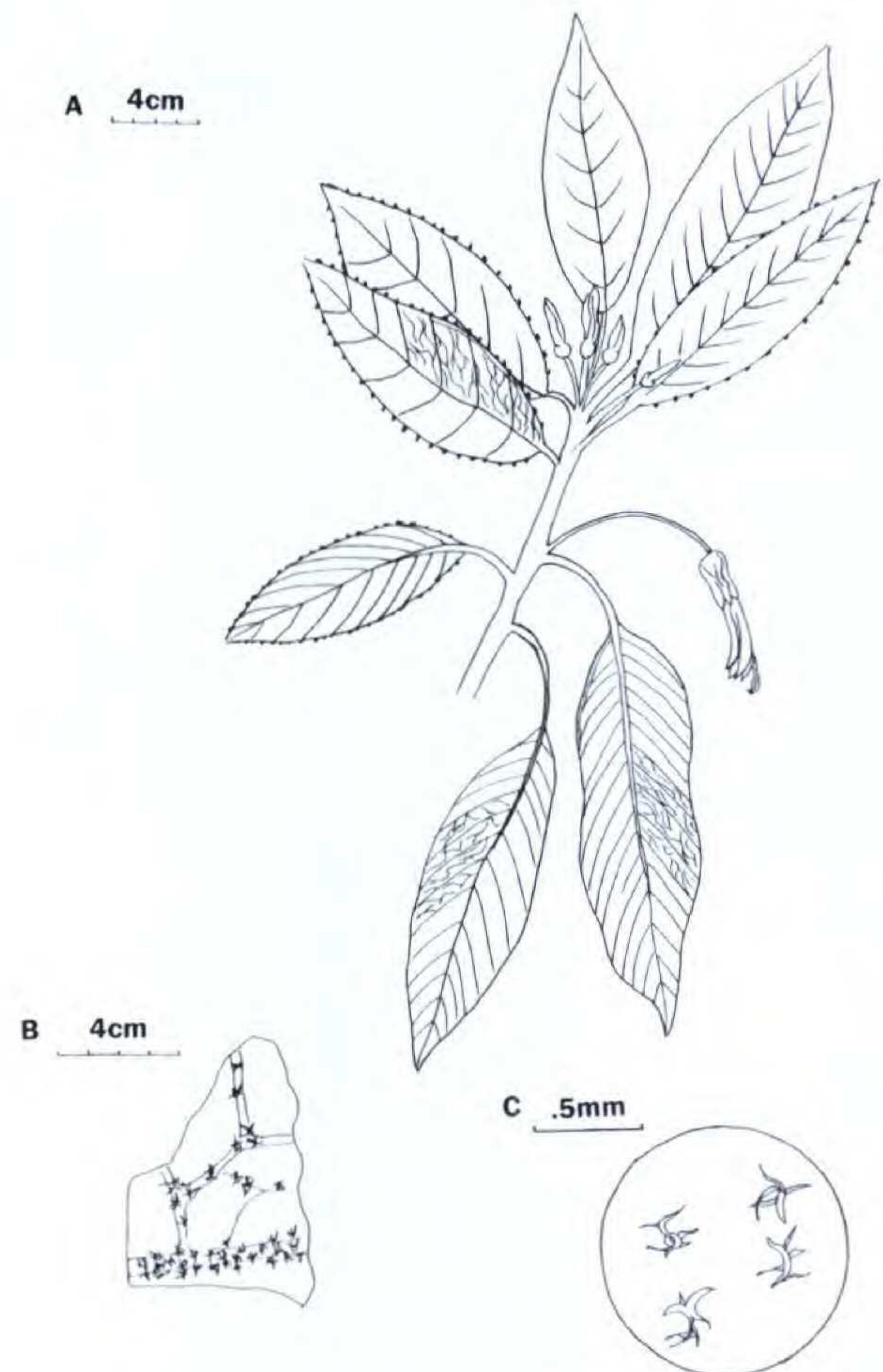


Figure 11. *Centropogon ulloae* Lammers. —A. Upper portion of stem with flower. —B, C. Arbusculiform trichomes on abaxial leaf surface. (Drawn from the holotype, Stein 2875.)

gin minutely denticulate with dark intramarginal callosities; apex acuminate; base obtuse or cuneate; petiole 20–40 mm long, 1.1–1.6 mm diam., 1/4–1/6 as long as the lamina, subglabrous or sparsely scabrid with minute arbusculiform trichomes. Flowers solitary in the upper leaf axils; pedicels ascending, 55 mm long, 1 mm diam., bibracteolate just above the base, subglabrous or sparsely scabrid with minute arbusculiform trichomes; bracteoles linear, 5 × 0.3 mm. Hypanthium oblate, 8 mm long, 13 mm diam., 1/6 as long as the corolla, glabrous. Calyx lobes narrowly oblong, erect, 18–19 × 3.5–4.5 mm, connate for half their length, more than twice as long as the hypanthium, about half as long as the corolla tube, moderately scabrid with minute arbusculiform trichomes; apex rounded or obtuse; margin entire. Corolla tubular, bilabiate, orange-red with yellow limb, 50 mm long, moderately scabrid with minute arbusculiform trichomes; tube bent above the base, 38 mm long, 10 mm diam. at mouth; dorsal lobes narrowly triangular, falcate, 12 × 4 mm, 1/3 as long as the tube, the apex acuminate; lateral lobes narrowly triangular, falcate, 9 × 2.5 mm, the apex acuminate; ventral lobe narrowly triangular, deflexed, 8 × 2.2 mm, the apex acuminate. Staminal column somewhat exerted be-

tween the dorsal lobes; filament tube suberect, 48 mm long, 1.9 mm diam., glabrous; anther tube 3 mm diam., suberect, gray, its surfaces glabrous; dorsal anthers 7 mm long, 1/7 as long as the filament tube; ventral anthers 5.3 mm long, pubescent at apex with tufts of stiff white hairs 1.3–1.5 mm long. Fruit and seeds not seen, but apex of ovary flat.

Distribution, habitat, and phenology. Apparently endemic to northern Ecuador and known only from the type specimen.

Etymology. It is a pleasure to name this species for Carmen Ulloa Ulloa (b. 1963), who served at the Pontificia Universidad Católica del Ecuador (QCA) as a research assistant (1986–1988) and *profesor agregado* (1990–1991) before joining the curatorial staff at Missouri Botanical Garden (MO) in 1992. Carmen is actively engaged in studies of the flora and biogeography of Andean forests and the páramos of Ecuador, co-edited *Flora de Nicaragua* (Stevens et al., 2001) and, with her husband Peter Møller Jørgensen (see above), is a contributor to the *Flora of Ecuador* project. It is an honor to commemorate this couple's many contributions to Latin American botany with a bouquet of *Centropogon*.

Relationships. *Centropogon ulloae* presents yet another challenge to McVaugh's (1949) classification of the genus. The combination of arbusculiform trichomes and "short-lobed" corolla would place this species in section *Siphocampyloides*, subsection *Brevilimbati*. However, the novelty shows little resemblance to any of those species. Its distinctive connate calyx lobes are almost unknown in section *Siphocampyloides*; within that group, only the recently described *C. connatilobatus* Lammers of Venezuela has basally connate calyx lobes. However, that species differs from *C. ulloae* in its much smaller leaves (2.6–6 × 0.6–1.9 cm vs. 12.5–17.5 × 4–4.6 cm in *C. ulloae*) with shorter petioles (4–17 mm vs. 20–40 mm); smaller hypanthium (3 mm vs. 8 mm long, 5 mm vs. 13 mm diam.) that is pubescent (vs. glabrous); shorter calyx lobes (12 mm vs. 18–19 mm long) that are acuminate at apex (vs. rounded or obtuse); and shorter corolla (42 mm vs. 50 mm long) with red limb (vs. yellow). Furthermore, the branched hairs of the novelty differ from those of section *Siphocampyloides* in their minuteness. The former are only 1/10 as long as those of the *Siphocampyloides*: 0.1–0.3 mm vs. 1–3 mm. Overall, it does not appear that *C. ulloae* is related to any member of section *Siphocampyloides*.

Though *C. ulloae* seems out of place in section *Siphocampyloides*, it does show great similarity to a group of four species within the Ecuadorean

branch of section *Wimmeriopsis*, subsection *Falcati* (see above): *C. aequitorialis* F. E. Wimmer (Carchi and Pichincha), *C. brachysiphoniatus* Zahlbruckner (Pichincha), *C. calycinus* Bentham (Imbabura and Pichincha), and *C. phoeniceus* Jeppesen (Napo). Like *C. ulloae*, these species possess calyx lobes that are longer than the hypanthium and connate. They further resemble *C. ulloae* in their pedicels equaling or longer than the flower, relatively long subbasal bracteoles, hypanthia broader than long, "short-lobed" corolla morphology, and glabrous filaments. In an earlier classification of the genus, Wimmer (1931) applied the rankless infrasectional name "Caligati F. E. Wimmer" to these plants; that name (which was included in the synonymy of subsection *Falcati* by McVaugh [1949]) will be used here to informally designate this species group.

The sole impediment to the assignment of *C. ulloae* to section *Wimmeriopsis* is its indumentum of arbusculiform hairs. Throughout section *Wimmeriopsis*, any hairs that are present are unbranched (though sometimes multicellular). However, in light of the great overall similarity of *C. ulloae* to the "Caligati," and the pronounced size difference between its arbusculiform trichomes and those of section *Siphocampyloides*, it seems best to assign the novelty to *Centropogon* sect. *Wimmeriopsis*, subsect. *Falcati*. Its minute arbusculiform hairs are thus hypothesized to represent yet another independent origin of branched trichomes among the Lobelioideae.

In addition to its sparse indumentum of minute arbusculiform trichomes, the new species differs from the other "Caligati" in details of its connate calyx lobes. In *C. ulloae*, the lobes are connate for half their length (vs. 2/3 or more of their length in *C. aequitorialis* and *C. calycinus* or 1/3 or less of their length in *C. brachysiphoniatus* and *C. phoeniceus*), rounded or obtuse (vs. acute) at apex, with the free margins entire (vs. toothed). The new species further differs from the other four "Caligati" in its longer (12.5–17.5 cm vs. 3–13 cm long) lanceolate or narrowly elliptic (vs. ovate, elliptic, or widely elliptic) leaves and orange-red corolla with yellow lobes (vs. red or purple only occasionally with yellow or white lobes).

6. *Centropogon vitifolius* Lammers, sp. nov.

TYPE: Peru. Amazonas: Condorcanqui Prov., Distr. El Cenepa, Región Nororiental del Marañón, comunidad de Kusu-kubaim, Río Co-maina, 04°25'S, 78°16'W, bosque primario, 700 m, 17 Aug. 1994, R. Vasquez, N. Jaramillo, R. Apanu & M. Ugkuch 18816 (holotype, OSH; isotypes, AMAZ not seen, MO). Figure 12.

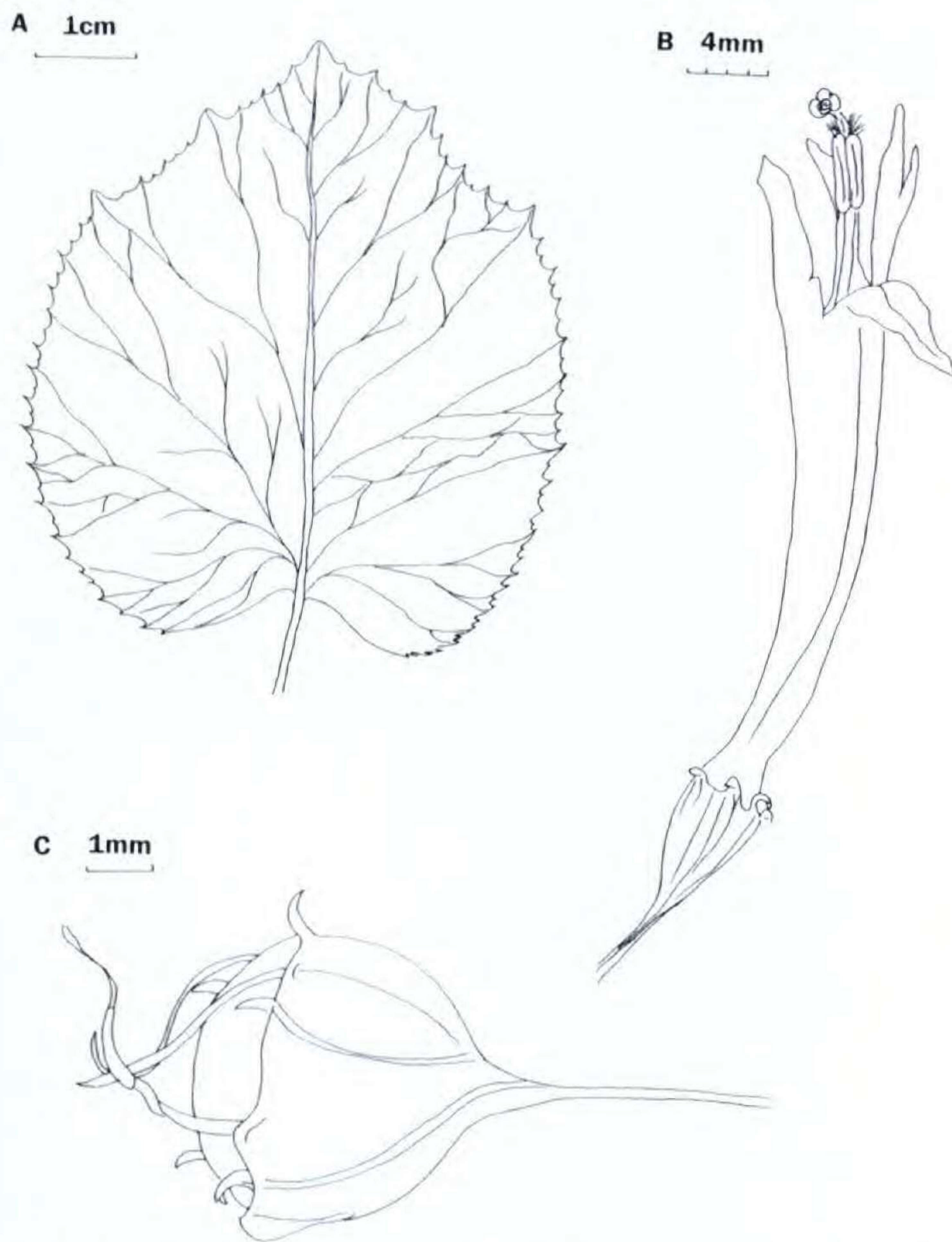


Figure 12. *Centropogon vitifolius* Lammers. —A. Leaf. —B. Flower. —C. Immature berry. (Drawn from the holotype, Vasquez *et al.* 18816.)

Species *Centropogonis* subsect. *Colombianorum* affinis *C. fimbriatulo* et *C. tessmannii*, sed ab his speciebus absentia (praeter antheras) trichomatum longorum, lamina cordata interdum subtrilobata, et corollae lobis longioribus (dorsalibus 18 mm longis, ventralibus 13 mm longis) facile distinguenda.

Suffruticose herb; stems moderately leafy, 1.5–3 mm diam., glabrous; latex white. Lamina ovate or widely ovate, appearing vaguely 3-lobed, 5–7.5 × 3.5–6.5 cm, chartaceous, glabrous; adaxial surface dull light green, glabrous; abaxial surface dull white-green; margin coarsely dentate with 4 to 7 teeth per cm, some distinctly larger than the others; apex acuminate; base cordate; petiole 15–32 mm long, 0.5–1.2 mm diam., 1/4–1/2 as long as the lamina, glabrous. Flowers solitary in the upper leaf axils; pedicels ascending, recurved after anthesis, 38–50 mm long, 0.8–1.2 mm diam., ebracteolate, minutely puberulent. Hypanthium obovoid or obconic, 7–8 mm long, 6–7 mm diam., 1/8–1/9 as long as the corolla, minutely puberulent. Calyx lobes triangular, recurved at apex, 2–2.2 × 0.7–1 mm, 1/4–1/3 as long as the hypanthium, 1/25 as long as the corolla tube, minutely puberulent; apex acute; margin entire. Corolla tubular, rose-colored, 65–68 mm long, minutely puberulent; tube curved, 50 mm long, 5–6 mm diam. at the base, narrowing

abruptly to 2.2–2.6 mm diam. above the base, then flaring gradually to 9–11 mm diam. just below the mouth; dorsal lobes linear-triangular, spreading, 18 × 2.5 mm, 1/3 as long as the tube, the apex acute; ventral lobes linear-triangular, deflexed, 13 × 2.5 mm, the apex acute. Staminal column slightly exerted between the dorsal lobes; filament tube curved, 58 mm long, 0.6 mm diam., glabrous; anther tube 2.2 mm diam., slightly curved, pubescent toward apex with long white hairs; dorsal anthers 7 mm long, 1/8 as long as the filament tube; ventral anthers 6.2 mm long, pubescent at apex with tufts of stiff dirty-white hairs 1 mm long. Fruit and seeds not seen, but apex of ovary flat.

Distribution, habitat, and phenology. Apparently endemic to northern Peru and known only from the type collection.

Etymology. The specific epithet is given in allusion to the resemblance of the leaves to those of certain species of grapes; from the genus *Vitis* L. (Vitaceae) and the Latin noun *folium*, leaf.

Relationships. On the basis of its simple trichomes and “short-lobed” corolla with spreading triangular lobes, *Centropogon vitifolius* is assigned to section *Wimmeriopsis*, subsection *Colombiani*. This group comprises 18 species distributed from southern Mexico to central Peru, plus an additional species endemic to Dominica and Guadeloupe in the Lesser Antilles (McVaugh, 1949; Lammers, 1998a). The new species is most similar to the only two members of the subsection found south of Colombia: *C. tessmannii* F. E. Wimmer (Amazonian lowlands of Ecuador and Peru) and *C. fimbriatulus* McVaugh (montane forests of southeastern Ecuador). These three species share a number of features, including habit, chartaceous ovate leaves with conspicuously toothed margins, ebracteolate pedicels, recurved calyx lobes, scarcely exerted staminal column, and pubescent anther tube. *Centropogon tessmannii* and *C. fimbriatulus* differ from the novelty in the increased pubescence of their vegetative organs (simple multicellular hairs up to 1.5 mm long vs. glabrous or minutely puberulent in *C. vitifolius*); cuneate, obtuse, or truncate (vs. cordate) leaf base; and shorter corolla lobes, both dorsal (6–11 mm vs. 18 mm) and ventral (6–9 mm vs. 13 mm). Neither species shows the tendency toward a trilobate leaf as seen in *C. vitifolius*.

Between *C. tessmannii* and *C. fimbriatulus*, the latter seems more similar to *C. vitifolius*, particularly in the length of its pedicels (4–7 cm), calyx lobes (2 mm), corolla (60–65 mm), and filament tube (45–55 mm). However, in addition to the features mentioned above, *C. fimbriatulus* further dif-

fers in its fimbriate leaf margin (vs. coarsely dentate in *C. vitifolius*) with 10 to 16 (vs. 4 to 7) teeth per cm, shorter (4–5 mm vs. 7–8 mm) hemispheric (vs. obconic or obovoid) hypanthium, pale lavender (vs. rose) corolla, and shorter (5–6 mm vs. 7 mm) dorsal anthers. *Centropogon tessmannii* does resemble *C. vitifolius* in its coarsely dentate leaf margin, longer obconic hypanthium, and longer dorsal anthers, but differs in its shorter (2–2.5 cm vs. 3.8–5 cm) pedicels, longer (3–10 mm vs. 2–2.2 mm) calyx lobes, shorter (46–60 mm vs. 65–68 mm) red (vs. rose-colored) corolla, and shorter (40–45 mm vs. 58 mm) filament tube. Overall, it seems best to regard the three species of *Centropogon* subsect. *Colombiani* occurring south of Colombia as a close-knit if not monophyletic group.

III. *Siphocampylus* Pohl, Pl. Bras. Icon. Descr. 2: 104. 1831. TYPE (lectotype, designated by McVaugh (1943: 100)): *Lobelia westiniana* Thunberg [= *Siphocampylus westinianus* (Thunberg) Pohl].

With the addition of the five novelties described here, *Siphocampylus* comprises 221 species, distributed from Costa Rica to Argentina, with several endemic to Cuba and Hispaniola (Lammers, 1998a). The genus resembles *Centropogon* overall, but differs in fruit type: baccate, from a flat-topped ovary, in *Centropogon*; capsular, from an ovary conical at apex, in *Siphocampylus*.

The most recent classification of *Siphocampylus* (Wimmer, 1953, 1968) is unsatisfactory for a variety of reasons (Pepper et al., 1997; Lammers, 1998a; also see below), but in the absence of an improved version, it must suffice here for purposes of discussion. In this classification, *Siphocampylus* was divided into two sections: sect. *Siphocampylus* ("Macrosiphon," nom. invalid.) and sect. *Brachysiphon* F. E. Wimmer. The latter section was divided into four subsections: subsect. *Secundiflori* F. E. Wimmer, subsect. *Altofissi* F. E. Wimmer, subsect. *Megastomi* F. E. Wimmer, and subsect. *Megalandri* F. E. Wimmer. The autonymic section was divided into four subsections: subsect. *Hemisiphocampylus* (A. DC.) F. E. Wimmer, subsect. *Byrsanthes* (C. Presl) F. E. Wimmer, subsect. *Isochilus* F. E. Wimmer, and subsect. *Siphocampylus* ("Eusiphocampylus," nom. invalid.). This last subsection was then subdivided into five greges: grex *Ectropici* (F. E. Wimmer) F. E. Wimmer, grex *Siphocampylus* ("Verticillati," nom. invalid.), grex *Umbellati* F. E. Wimmer, grex *Botryoides* F. E. Wimmer, and grex *Dissitiflori* F. E. Wimmer. Several of the subsections

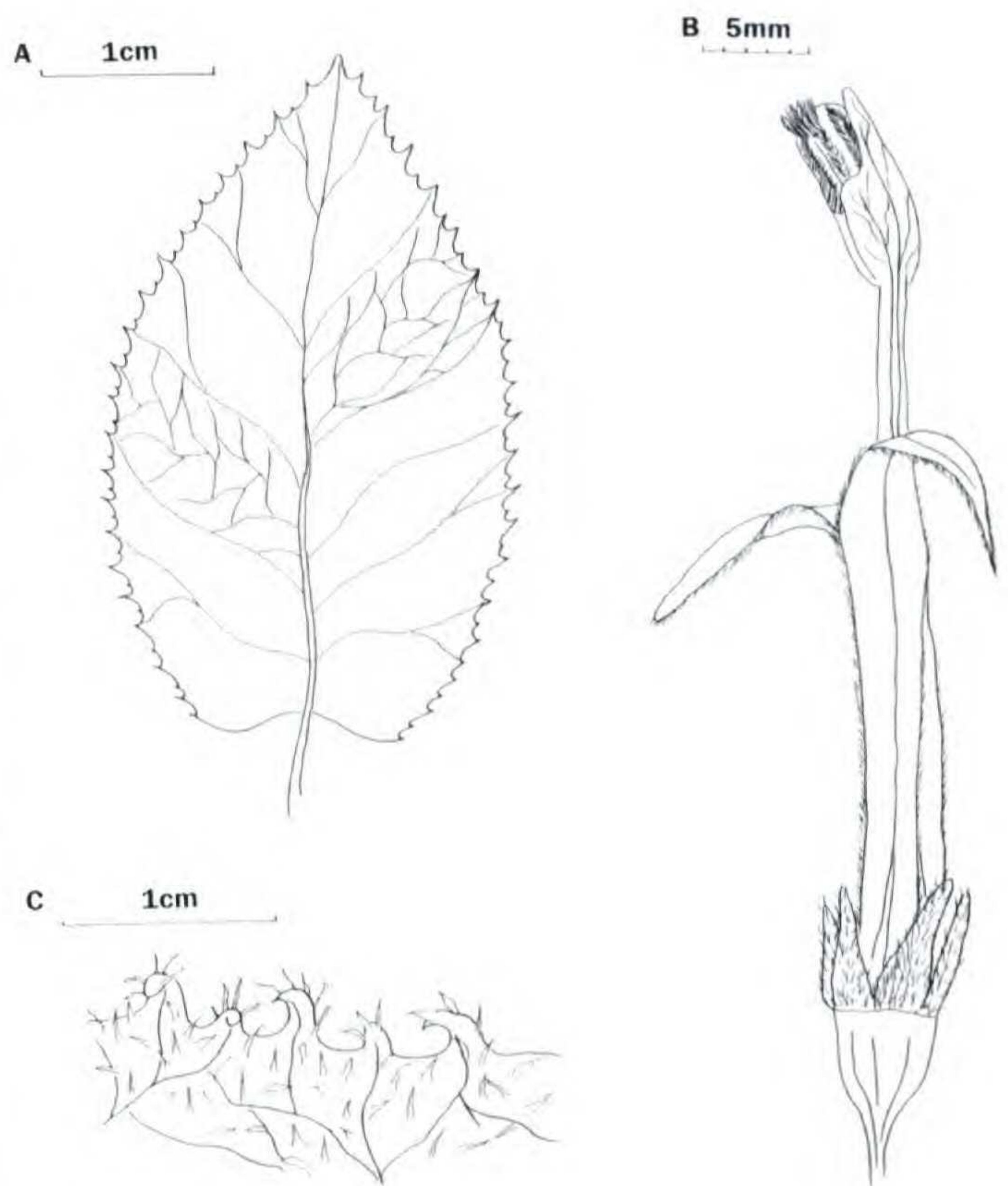


Figure 13. *Siphocampylus adhaerens* Lammers. —A. Leaf. —B. Flower. —C. Leaf margin. (Drawn from the holotype, Luteyn et al. 5299.)

and greges were further divided into subordinate taxa.

1. *Siphocampylus adhaerens* Lammers, sp. nov.
TYPE: Venezuela. Táchira: Hwy. 9, Quebrada de Cocoroco, 11 km S of Delicias, 1800 m, 28 Jan. 1978, J. L. Luteyn, M. Lebron-Luteyn, L. Ruiz-Teran & J. A. Dugarte 5299 (holotype, OSH; isotype, MERF not seen, NY, VEN not seen). Figure 13.

Species ob corollam infundibularem et foliorum laminam cordatam vel subcordatam affinis *Siphocampylo megalantho* et speciebus similaribus, sed ab his speciebus pedicellis bibracteolatis brevioribus 1.9–2.8 cm longis, corollae tubo ad orem angustiore 4.6–6.7 mm diametro, antheris dorsalibus brevioribus 6–6.5 mm longis, et corollae lobis dorsalibus linearibus strictis longioribus 15–19 mm longis ventralibus dimidia parte longioribus sed dimidio latitudine adhaerentibus staminali columna statim distinguenda.

Suffrutescent herb; stems scandent, moderately leafy, 2.3–3 mm diam., moderately pubescent with long weak spreading white hairs; latex white. Lamina ovate, 4.5–9 × 3.5–5.5 cm, chartaceous; adaxial surface dull olive green, sparsely pubescent with short weak appressed white hairs; abaxial surface dull, paler, moderately pubescent (densest on the veins) with long weak spreading white or yellow hairs; margin conspicuously fimbriate with 7 to 10 teeth per cm, teeth 0.5–0.7 mm long alternating

with teeth 1.3–1.5 mm long; apex acuminate; base cordate (often asymmetric), subcordate, or truncate; petiole 14–27 mm long, 0.7–0.9 mm diam., 1/3–1/5 as long as the lamina, densely pubescent with long weak spreading white or yellow hairs. Flowers solitary in distal leaf axils; pedicels straight (curved if scandent stem declinate), ascending, 19–28 mm long, 0.6–0.9 mm diam., bibracteolate at base, densely pubescent with long weak spreading yellow hairs; bracteoles subulate, 1.5–2 × 0.2–0.3 mm. Hypanthium turbinate, 5 mm long, 5–7 mm diam., ca. 1/10 as long as the corolla, densely pubescent with long weak spreading yellow hairs. Calyx lobes narrowly triangular, erect, 6.5–7.7 × 2.5–3 mm, 1/3–1/2 again as long as the hypanthium, ca. 1/5 as long as the corolla tube, densely pubescent with long weak spreading yellow hairs; apex acuminate; margin entire. Corolla bilabiate, infundibular, dark pink outside, paler within, 50–55 mm long, sparsely pubescent along the five major veins with long weak spreading white hairs; tube slightly curved, 33–37 mm long, 3.8–4 mm diam. at base, abruptly narrowing to an isthmus 1.9–2.4 mm diam. just above base, then gradually expanding to 4.6–6.7 mm diam. at mouth; dorsal lobes linear, strictly erect, closely adherent to the staminal column, 15–19 × 0.9–1.2 mm, 2/5–1/2 as long as the tube, the apex acuminate; ventral lobes narrowly triangular, recurved, 9–12 × 1.8–2.5 mm, the apex acuminate. Staminal column exerted between the adherent dorsal lobes; filament tube slightly curved, 45–52 mm long, 0.9–1 mm diam., glabrous; anther tube 2–2.3 mm diam., slightly curved, sparsely pubescent along the connectives with long weak appressed white hairs; dorsal anthers 6–6.5 mm long, 1/7–1/8 as long as the filament tube; ventral anthers 4–4.5 mm long, their apex pubescent with tufts of stiff white hairs 1.5–2 mm long. Capsule rhomboid, 12 mm long, 9 mm diam., half-inferior; seeds broadly ellipsoid, light brown, 0.6 mm long, 0.4 mm diam., the testa minutely reticulate.

Distribution, habitat, and phenology. Apparently endemic to western Venezuela and known only from the type collection.

Etymology. The specific epithet is the Latin participle *adhaerens*, adherent, given in reference to the unusual adherence of the dorsal corolla lobes to the staminal column.

Relationships. In Wimmer's (1953, 1968) treatment of *Siphocampylus*, *S. adhaerens* keys to a group of six Colombian species in section *Siphocampylus*, subsection *Siphocampylus*, grex *Dissitiflori* F. E. Wimmer, subgrex *Pyriformes* F. E. Wim-

mer: *S. coronatus* Gleason, *S. hypsophilus* F. E. Wimmer, *S. lecomtei* F. E. Wimmer, *S. megalanthus* Zahlbruckner, *S. sissii* F. E. Wimmer, and *S. venosus* Gleason. These plants share with the novelty a pink, red, or red-purple distinctly infundibular corolla (vs. subcylindric in other species of subgrex *Pyriformes*) 50–62 mm long, and ovate laminas cordate or subcordate at base, and are likely its closest relatives.

Siphocampylus adhaerens may be distinguished from these six species by several characters. The pedicels of all six lack bracteoles and are longer (3–15 cm vs. 1.9–2.8 cm in *S. adhaerens*); their corolla tubes are broader in diameter at the mouth (9–12 mm vs. 4.6–6.7 mm); and their dorsal anthers are longer (7–10 mm vs. 6–6.5 mm). However, the most conspicuous characters distinguishing *S. adhaerens* from its allies involve the dorsal lobes of the corolla.

First, the dorsal corolla lobes of *S. megalanthus* and its allies are shorter than those of *S. adhaerens*: 9–15 mm vs. 15–19 mm. Second, they are similar to the ventral lobes in size, shape, and posture. *Siphocampylus adhaerens*, in contrast, has distinctly dimorphic corolla lobes: the dorsal pair are broadly linear, the ventral narrowly triangular. Furthermore, the dorsal pair are more than half again as long as the ventral three (15–19 mm vs. 9–12 mm) but only half as wide (0.9–1.2 mm vs. 1.8–2.5 mm). In almost all other species of the genus, the dorsal and ventral corolla lobes are of approximately equal width. Three species have dorsal lobes wider than the ventral: *S. planchonii* F. E. Wimmer, *S. polyanthus* F. E. Wimmer, *S. quetamensis* F. E. Wimmer. Only in *S. isochilus* F. E. Wimmer and *S. sceptrum* Decaisne [which comprise *Siphocampylus* sect. *Siphocampylus*, subsect. *Isochilus* F. E. Wimmer (Wimmer, 1968)] are the ventral corolla lobes wider than the dorsal. However, these two species differ from *S. adhaerens* in numerous features (including the open orifice of their *Burmeistera*-like anther tube; cf. Stein, 1987; Lammers, 1998a), and are not closely related to the new species.

Finally, whereas all five corolla lobes have a spreading or recurved posture in *S. megalanthus* and its allies, this is true for only the ventral three in *S. adhaerens*. The dorsal pair are strictly erect and adhere closely to the exerted staminal column, hiding it from sight. This close adherence of the dorsal corolla lobes to the staminal column appears to be unique in the genus, and perhaps in the subfamily.



Figure 14. *Siphocampylus ambivalens* Lammers. (Drawn from the holotype, Vargas 5061.)

2. *Siphocampylus ambivalens* Lammers, sp. nov. TYPE: Bolivia. Florida: Bermejo, 5 km al E subiendo hacia el sillar Tres Cruces, camino del gaseoducto y zona de la antena, 18°08'S, 63°35.5'W, bosque alto en laderas y ondonadas con *Cariniana estrellensis*, *Pachistroma longifolia* y *Myroxylom peruiferum*, ca. 500 m, 2 Aug. 1996, I. G. Vargas C. 5061 (holotype, OSH; isotypes, NY, USZ not seen). Figure 14.

Species *Siphocampyli* positione ambivalente umbellam apicalem gregis *Umbellatorum* et folia verticillata gregis *Siphocampyli* combinans.

Shrub, 2–3 m tall; stems scandent, moderately leafy, branched from the base, 3 cm diam. at base, 2.7–5 mm diam. toward apex, moderately pubescent with short scurfy brown hairs; latex white. Leaves whorled, 3 per node, gradually decreasing in size toward apex; lamina narrowly ovate, 6.5–11 × 2.2–4.8 cm, subcoriaceous; adaxial surface dull dark green, sparsely pubescent on the midrib with short scurfy brown hairs; abaxial surface dull light green, moderately pubescent with longer crisped white or brown hairs; margin doubly serrate; apex acuminate; base rounded or subcordate; petiole 5–7 mm long, 1–1.5 mm diam., 1/10–1/20 as long as the lamina, densely pubescent with short scurfy brown hairs. Flowers 7 to 10 in a terminal sessile umbel subtended by a whorl of 3 foliage leaves; bracts linear, 14–15 mm long, 1 mm diam., the apex acuminate; pedicels straight, ascending, 18–22 mm long, 0.5–0.6 mm diam., ebracteolate, densely pubescent with short scurfy brown hairs. Hypanthium broadly obconic or hemispheric, 3–4

mm long, 5 mm diam., 1/12–1/20 as long as the corolla, moderately pubescent with short scurfy brown hairs. Calyx lobes linear-triangular, erect or slightly spreading, 10–12 × 0.7–1 mm, 3–3× as long as the hypanthium, 1/3–1/4 as long as the corolla tube, densely pubescent with short scurfy brown hairs; apex acuminate; margin entire. Corolla tubular, bilabiate, pink-purple with green-yellow limb, 52–56 mm long, densely pubescent with short stiff pale hairs; tube suberect, 38–43 mm long, 5–5.5 mm diam. at base, narrowing to an isthmus 3–4 mm diam. just above base, then gradually expanding to 6.5–8 mm diam. at mouth; dorsal lobes linear-triangular, 13–14 × 1.3–2.3 mm, ca. 1/3 as long as the tube, the apex acuminate; lateral lobes linear-triangular, 11–13 × 2–2.5 mm, the apex acuminate; ventral lobe linear-triangular, 15–16 × 2.5–2.8 mm, the apex acuminate. Staminal column somewhat exerted between the dorsal lobes; filament tube suberect, 47–50 mm long, 1 mm diam., glabrous; anther tube 2–2.1 mm diam., gently curved, with a few long weak white hairs dorsally; dorsal anthers 9–10 mm long, ca. 1/5 as long as the filament tube; ventral anthers 6–7 mm long, their apex pubescent with tufts of stiff white hairs 1.5–2 mm long. Fruit and seeds not seen, but apex of ovary conic, pubescent.

Distribution, habitat, and phenology. Apparently endemic to central Bolivia and known only from the type collection.

Etymology. The specific epithet refers to the species' equivocal taxonomic position in Wimmer's (1953, 1968) classification; from the Latin participle *ambivalens*, ambivalent.

Relationships. *Siphocampylus ambivalens* clearly is referable to section *Siphocampylus*, subsection *Siphocampylus* in Wimmer's (1953, 1968) classification. Within that subsection, however, it combines features of two of the five greges recognized by Wimmer (1953): the terminal umbellate inflorescence of grex *Umbellati* and the whorled leaves of grex *Siphocampylus*. *Siphocampylus* grex *Umbellati* comprises nine species endemic to Colombia [*S. amalfiensis* F. E. Wimmer, *S. densiflorus* Planchon, *S. glareosus* Zahlbruckner, *S. lindleyi* Lemaire, *S. longibracteolatus* F. E. Wimmer, *S. lucifer* F. E. Wimmer, *S. microstoma* Hooker] or Venezuela [*S. moritzianus* F. E. Wimmer, *S. reticulatus* (Willdenow ex Schultes) Klotzsch & H. Karsten ex Vatke], plus one additional species [*S. corymbiferus* Pohl] distributed in Peru, Bolivia, and Brazil (Wimmer, 1953). *Siphocampylus* grex *Siphocampylus* comprises seven species endemic to southern Brazil [*S. duploserratus* Pohl, *S. fluminensis* (Vellozo) F. E. Wim-

mer, *S. psilophyllus* Pohl, *S. sulfureus* F. E. Wimmer, and *S. westinianus* (Thunberg) Pohl] or Bolivia [*S. orbignianus* A. DC., *S. tenuisepalus* F. E. Wimmer], plus one [*S. verticillatus* (Chamisso) G. Don] distributed in Brazil, Paraguay, Uruguay, and Argentina.

All known species of *Siphocampylus* grex *Umbellati* have alternate leaves. If one ignores its verticillate leaves, *S. ambivalens* will key to *S. reticulatus* of western Venezuela in Wimmer's (1953) treatment of grex *Umbellati*. The two species are similar in a number of features, including size and shape of their leaves, their linear bracts, ebracteolate pedicels, pubescent corollas, and glabrous staminal columns. However, *S. reticulatus* differs in its shorter (1–1.8 m vs. 2–3 m) stature, turbinate (vs. broadly obconic or hemispheric) hypanthium, shorter (35–40 mm vs. 52–56 mm) corolla, and shorter anthers (dorsal pair 5 mm vs. 9–10 mm).

The only species of *Siphocampylus* grex *Umbellati* known from Bolivia is *S. corymbiferus*, whose range extends into Peru and Brazil. This species likewise shows some similarity to *S. ambivalens* in size and shape of its leaves, its ebracteolate pedicels, and glabrous staminal column. However, *S. corymbiferus* differs in its shorter stature (0.6–1.5 m vs. 2–3 m in *S. ambivalens*), longer (8–15 mm vs. 5–7 mm) petioles, ovate or lanceolate (vs. linear) bracts, longer (30–45 mm vs. 18–22 mm) pedicels, short turbinate (vs. broadly obconic or hemispheric) hypanthium, shorter (4–6 mm vs. 10–12 mm) calyx lobes, and shorter (40–50 mm vs. 52–56 mm) glabrous (vs. pubescent) corolla.

All known species of *Siphocampylus* grex *Siphocampylus* have flowers solitary in leaf axils. If one ignores its umbellate inflorescence, *S. ambivalens* will key to *S. westinianus* of southern Brazil in Wimmer's (1953) treatment of grex *Siphocampylus*. The two are similar in a number of features, including size and shape of their leaves, size and color of their corollas, and glabrous staminal columns. However, *S. westinianus* differs in its shorter stature (0.6–0.8 m vs. 2–3 m in *S. ambivalens*), bibracteolate (vs. ebracteolate) pedicels, turbinate (vs. broadly obconic or hemispheric) hypanthium, and shorter (3–4 mm vs. 10–12 mm) calyx lobes.

Two other verticillate-leaved species are endemic to Bolivia: *S. orbignianus* and *S. tenuisepalus*. Both share a number of characters with the new species, e.g., leaf size and shape and corolla size and color are similar in *S. ambivalens* and *S. orbignianus*, hypanthium shape and pedicel length in *S. ambivalens* and *S. tenuisepalus*. However, *S. orbignianus* differs from *S. ambivalens* in its longer (35–40 mm vs. 18–22 mm in *S. ambivalens*) divergent (vs. as-

ending) bibracteolate (vs. ebracteolate) pedicels, broadly turbinate (vs. broadly obconic or hemispheric) hypanthium, and spreading or reflexed (vs. erect or slightly spreading) calyx lobes. *Siphocampylus tenuisepalus* differs from *S. ambivalens* in its glabrous (vs. pubescent) stems, narrower (2 cm vs. 2.2–4.8 cm) lanceolate (vs. narrowly ovate) laminae cuneate (vs. rounded or subcordate) at base, longer (10 mm vs. 5–7 mm) glabrous (vs. pubescent) petioles, longer (12–17 mm vs. 10–12 mm) spreading or reflexed (vs. erect or slightly spreading) calyx lobes, and longer (65 mm vs. 52–56 mm) corolla.

After careful comparison, it is concluded that despite its umbellate inflorescence, *S. ambivalens* is most likely allied to the verticillate-leaved species that make up *Siphocampylus* grex *Siphocampylus*. Geographic relationships support this view: all but one of the species of grex *Umbellati* are endemic to Colombia or Venezuela while all but one of the species of grex *Siphocampylus* are endemic to Brazil or Bolivia. Further, condensation of stem apices to form corymbiform or umbellate inflorescences appears to have occurred independently in several genera of Lobelioideae (*Burmeistera*, *Centropogon*, *Lobelia*) while the sole occurrence of verticillate leaves in the subfamily is in the species of grex *Siphocampylus*. It is thus more parsimonious to hypothesize that *S. ambivalens* is a member of *Siphocampylus* grex *Siphocampylus* that has evolved an umbellate inflorescence from solitary axillary flowers, rather than a member of grex *Umbellati* that has evolved whorled leaves from alternate.

3. *Siphocampylus longior* Lammers, sp. nov.

TYPE: Peru. San Martín: Prov. Rioja, Buenos Aires, along road Pedro Ruiz–Rioja, 05°42'09"S, 77°53'06"W, wet cloud forest, ca. 2000 m, 21 Mar. 1998, H. van der Werff, B. Gray, R. Vasquez & R. Rojas 15376 (holotype, OSH; isotype, MO). Figure 15.

Species *Siphocampyli* subsect. *Secundiflorum* ab omnibus caeteris speciebus hujus subsectionis petiolis longioribus 15–23 mm longis, pedicellis longioribus 40–65 mm longis, calycis lobis longioribus 7–10 mm longis, et antheris dorsalibus longioribus 11–14 mm longis facile distinguenda.

Suffrutescent liana; stems scandent, often horizontal or pendent, branched, moderately leafy, 2–5 mm diam., minutely scabrid; latex white. Leaves secund; lamina ovate or oblong, 3.5–6 × 2.2–3.2 cm, chartaceous; adaxial surface dull olive green, glabrous; abaxial surface dull, paler, minutely scabrid on the veins; margin minutely serrulate; apex acute or obtuse; base rounded, truncate, or subcordate, and sometimes asymmetric; petiole 15–23

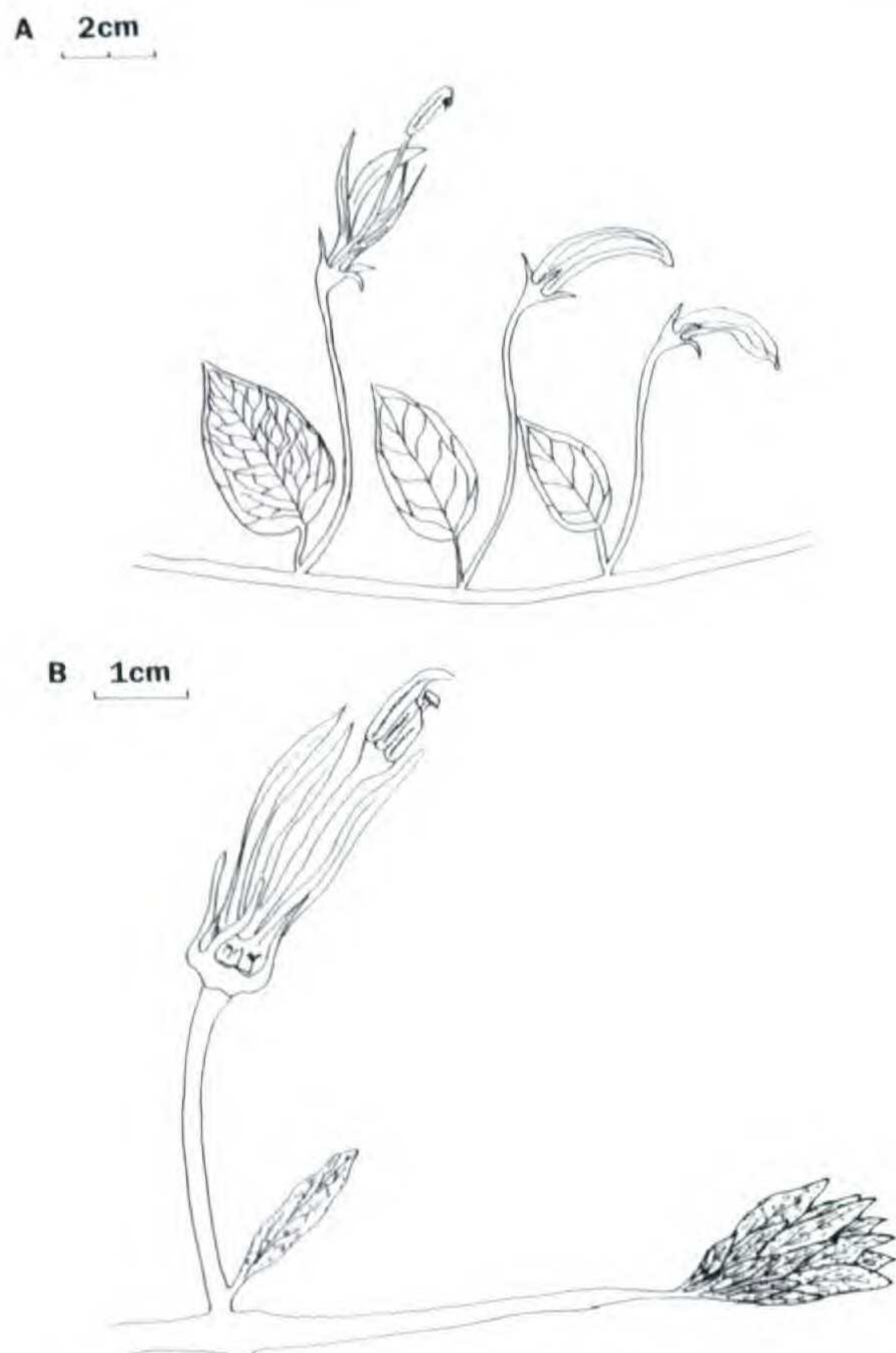


Figure 15. *Siphocampylus longior* Lammers. —A. Upper portion of stem with flowers. (Drawn from the holotype, *van der Werff et al.* 15376.) —B. Flower. (Drawn from the paratype, *van der Werff et al.* 15746.)

mm long, 0.8–1 mm diam., 1/2–1/3 as long as the lamina, minutely scabrid. Flowers in a secund terminal bracteate raceme or sometimes in the axils of unreduced leaves; bracts elliptic, 1.4–1.9 × 0.4–0.7 cm, minutely scabrid, acute or acuminate at apex, attenuate at base, the margin minutely serrulate, on petioles 6–7 mm long; pedicels ascending, curved toward apex, 40–65 mm long, 1.2–1.8 mm diam., ebracteolate, minutely scabrid. Hypanthium turbinate, 5–8 mm long, 7–8 mm diam., 1/5–1/7 as long as the corolla, minutely puberulent. Calyx lobes subulate, ascending, sometimes recurved toward apex, 7–10 × 0.8–1.2 mm above the base, slightly longer than the hypanthium, minutely scabrid; apex acuminate; margin entire. Corolla (imperfect in the material seen) green or maroon, 35–40 mm long, puberulent, more densely so toward base. Filament tube suberect, 32 mm long, 1 mm diam., glabrous; anther tube 3 mm diam., slightly curved, its surfaces glabrous; dorsal anthers 11–14 mm long, 1/3 as long as the filament tube; ventral anthers 8–10 mm long, their apex pubescent with tufts of stiff white hairs 2.5–3 mm long. Fruit and seeds not seen, but apex of ovary conic.

Distribution, habitat, and phenology. Apparently endemic to northern Peru, with both known collections obtained along the road between Pedro Ruiz and

Rioja in Departamento de San Martín. Growing in wet cloud forest at 1900–2000 m and flowering in March.

Etymology. The specific epithet is the comparative of the Latin adjective *longus*, i.e., longer, in reference to the fact that this species' petioles, pedicels, calyx lobes, and anthers are longer than those of any other member of the subsection.

Relationships. With its secund terminal bracteate raceme of relatively short-pedicelled flowers, *Siphocampylus longior* is clearly a member of section *Brachysiphon*, subsection *Secundiflori*. This subsection comprises nine species: *S. purdieanus* Planchon is endemic to Colombia, *S. ayersiae* Lammers to Bolivia, and the remainder are distributed in Peru and southern Ecuador (Wimmer, 1953; Lammers, 1998a).

Although the specimens at hand are imperfect, with flowers either in bud or past anthesis, it is clear that they cannot be equated with any previously described member of subsection *Secundiflori*, as their petioles, pedicels, calyx lobes, and anthers are all significantly longer. In the other species of the subsection, petioles are 4–15 mm long (vs. 15–23 mm in *S. longior*), pedicels 8–42 mm long (vs. 40–65 mm), calyx lobes 1–5 mm long (vs. 7–10 mm), and dorsal anthers 7–11 mm long (vs. 11–14 mm).

Paratypes. PERU. **San Martín:** Prov. Rioja, along road Rioja–Pedro Ruiz, El Mirador, 1900 m, 26 Mar. 1998, *H. van der Werff, B. Gray, R. Vasquez & R. Rojas* 15746 (MO, OSH).

4. *Siphocampylus plegmatocaulis* Lammers, sp. nov. TYPE: Peru. San Martín: Prov. Rioja, along road Rioja–Pedro Ruiz, ceja de la montaña, El Mirador, 05°40'29"S, 77°46'25"W, 1850 m, 25 Mar. 1998, *H. van der Werff, B. Gray, R. Vasquez & R. Rojas* 15628 (holotype, OSH; isotype, MO). Figure 16.

Species *Siphocampyli* subgregis *Pyriiformium* ob caules dimorphos et trichomata dimorpha ad orificium tubi antherarum insignis; caules primigeni horizontales 1.2–1.8 mm diametro volubiles dextrorsum (externe visus) sparsim foliacei vel demum nudi, sed rami erecti 0.8–1 mm diametro confertim foliacei basin versus et remote foliacei flagelliformes apicem versus; trichomata ad apicem antherarum dorsalium 0.1–0.3 mm longa, sed haec antherarum ventralium 1–1.4 mm longa.

Vine with dimorphic stems; main stems horizontal, elongate, dextrorsely twining (in external view), 1.2–1.8 mm diam., sparsely leafy or eventually leafless, minutely scabrid; branches erect, 0.8–1 mm diam., highly condensed and densely leafy at base, whip-like and sparsely leafy distally. Lamina narrowly elliptic (sometimes lanceolate on the elongate portions of branches), 1.9–4 × 0.5–1.3 cm, char-

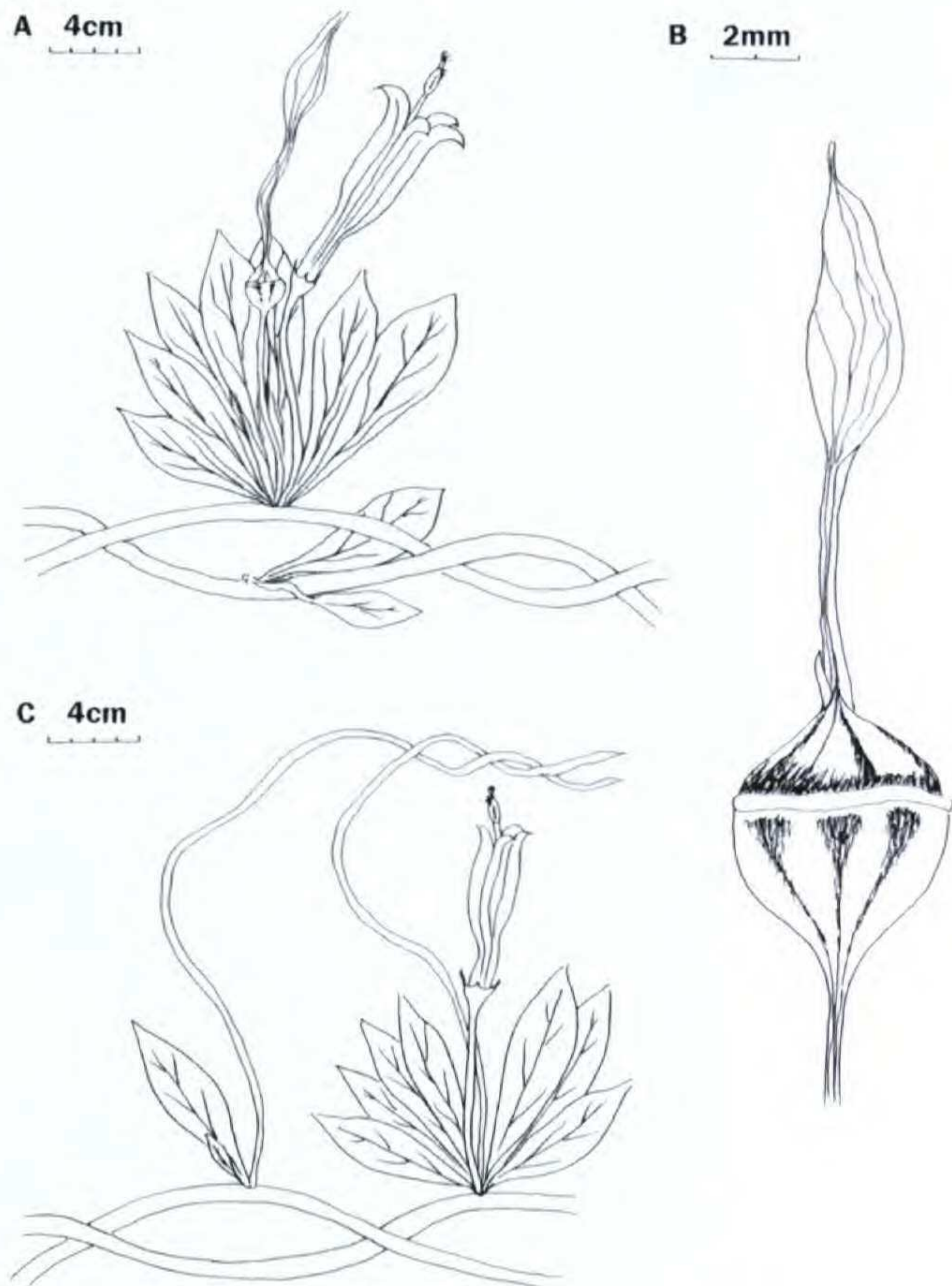


Figure 16. *Siphocampylus plegmatocaulis* Lammers. — A. Portion of horizontal twining main stem with condensed young branch. — B. Young capsule, topped by marcescent corolla. — C. Portion of main stem with erect branches older, elongated, whip-like. (Drawn from the holotype, *van der Werff et al.* 15628.)

taceous; adaxial surface dull olive green, glabrous; abaxial surface dull, paler, sparsely scabrid with minute dark antrorse trichomes; margin minutely serrulate or crenulate with 1 to 4 exserted dark callosities per side; apex acute (sometimes acuminate on the elongate portions of branches), mucronate; base cuneate; petiole 3–7 mm long, 0.6–0.8 mm diam., 1/4–1/10 as long as the lamina, minutely scabrid. Flowers solitary in axils of leaves on the branches; pedicels ascending, 15–38 mm long, 0.5–0.7 mm diam., ebracteolate, hispidulous or minutely scabrid. Hypanthium broadly obconic or turbinate, 2.5–3.5 mm long, 3.1–3.6 mm diam., ca. 1/10 as long as the corolla, hispidulous. Calyx lobes narrowly triangular, erect, slightly recurved at tips, 0.8–1.5 × 0.5–0.7 mm, 3/10–2/5 as long as the hypanthium, ca. 1/20 as long as the corolla tube, hispidulous at base; apex acuminate; margin entire. Corolla deep pink, red, or red-purple, tubular, bilabiate, 27–32 mm long, sparsely hispidulous; tube comprising a proximal isthmus ca. 8 mm long, 2.5–3.4 mm diam. at base and 1.5–2.2 mm diam. at apex, which bends and flares abruptly into an expanded distal portion 8–16 mm long and 4.5–5.5 mm diam. at mouth; dorsal lobes linear-

triangular, 7–10 × 1.5–2 mm, spreading, 1/2–1/3 as long as the tube, acuminate at apex; ventral lobes linear-triangular, 7–9 × 1.5–1.9 mm, spreading, acuminate at apex. Staminal column slightly exserted; filament tube suberect, 23–26 mm long, 1 mm diam., glabrous; anther tube 1.6–1.7 mm diam., suberect, its surfaces glabrous; dorsal anthers 4.5–5 mm long, 1/5 as long as the filament tube, their apex pubescent with tufts of stiff white hairs 0.1–0.3 mm long; ventral anthers 3.5–4 mm long, their apex pubescent with tufts of stiff white hairs 1–1.4 mm long. Capsule obovoid, 8–9 mm long, 5.5–6 mm diam., 2/3–3/4-inferior; mature seeds not seen.

Distribution, habitat, and phenology. Apparently endemic to northern Peru, collected a few times in the vicinity of Pedro Ruiz in Departamento de San Martín. Growing in *pajonal* vegetation on exposed ridges and in shrubs bordering cloud forest, 1850–2200 m. Flowering from February to August; fruit maturing from March to August.

Etymology. The specific epithet refers to the dextrorsely twining stems; from the Greek nouns *πλεγμα*, twist, and *καυλος*, stem.

Relationships. Though many species of *Siphocampylus* are scandent, a truly twining habit is rare in the genus, known from only *S. convolvulaceus* (Chamisso) G. Don of Brazil and *S. cordatus* (Willdenow ex Schultes) F. E. Wimmer of Venezuela and Colombia. These two species are referable to *Siphocampylus* sect. *Siphocampylus*, subsect. *Siphocampylus*, grex *Dissitiflori*, subgrex *Pyriformes*, as is the new species. These three species further share ebracteolate pedicels, obconic or turbinate hypanthia, and glabrous filament tubes. However, *S. convolvulaceus* and *S. cordatus* differ from *S. plegmatocaulis* in their longer petioles (5–20 mm vs. 3–7 mm in *S. plegmatocaulis*); larger laminas (4–9 × 1.2–3 cm vs. 1.9–4 × 0.5–1.3 cm) that are rounded, truncate, or subcordate (vs. cuneate) at base; longer calyx lobes (2–7 mm vs. 0.8–1.5 mm); corollas that are longer (45–60 mm long vs. 27–32 mm long) and broader (2–3 mm at isthmus vs. 1.5–2 mm, 5–9 mm at mouth vs. 4.5–5.5 mm); longer dorsal anthers (6–7 mm vs. 4.5–5 mm) that are glabrous (vs. bearded) at apex; and longer capsules (1.5–2 cm vs. 0.8–0.9 cm).

Though *S. convolvulaceus* and *S. cordatus* are twining vines, neither produces the unique dimorphic stems of *S. plegmatocaulis*. For this reason, it seems unlikely that the new species is closely related to either of the other two twiners. Instead, *S. plegmatocaulis* may represent an independent origin of the twining habit, perhaps as an adaptation

to life in exposed, nutrient-poor *pajonal*, an unusual habitat for the genus.

In addition to the dimorphic twining stems, the dimorphic pubescence surrounding the orifice of the anther tube in *S. plegmatocaulis* is unique in *Siphocampylus*. Most members of the genus only have apical tufts of trichomes on the ventral pair of anthers. Just five species bear tufts of trichomes at the apex of all five anthers: *S. isochilus*, *S. os-citans* B. A. Stein, *S. sceptrum* (sometimes all five glabrous), *S. rusbyanus* Britton, and *S. splendens* (F. E. Wimmer) Jeppesen ex B. A. Stein. However, in these five species, the hairs of the dorsal and ventral anthers are similar in size, while those of *S. plegmatocaulis* differ significantly: 0.1–0.3 mm on the three dorsal anthers, 1–1.4 mm long on the ventral pair. Furthermore, these five species all have a *Burmeistera*-like anther tube with a wide open orifice (cf. Stein, 1987; Lammers, 1998a). In *S. plegmatocaulis*, the orifice of the anther tube is occluded, as is typical for *Siphocampylus* and most genera of Lobelioideae. None of these five species is referable to *Siphocampylus* subsect. *Siphocampylus*, and none is believed to be related to *S. plegmatocaulis*. In summary, the affinities of this new species remain obscure.

Paratypes. PERU. **San Martín**: Prov. Rioja, Pedro Ruiz–Moyobamba road, km 368, Campamento García, 05°45'S, 77°43'W, *pajonal* vegetation, a vegetation type developing due to exposure and poor soil, here found on ridges, 1900 m, 14 Aug. 1983, *D. N. Smith 4803* (MO, OSH); Prov. Rioja, Río Nieva valley, ca. 100 km W of Rioja on road to Pedro Ruiz, 1 km E of Puente Río Nieva, 05°47'S, 77°40'W, twining through shrubs along road in low cloud forest, 2000 m, 16 Feb. 1985, *B. Stein & C. Todzia 2204* (MO).

5. *Siphocampylus praevaricator* Lammers, sp. nov. TYPE: Venezuela. Mérida: Páramo de los Colorados, road to San Isidro Alto, 4 km from junction with Estanques–Páramo del Molino road, 2600 m, 3 Feb. 1978, *J. L. Luteyn, M. Lebron-Luteyn & L. Ruiz-Teran 5408* (holotype, OSH; isotypes, MERF not seen, NY, VEN not seen). Figure 17.

Species ob trichomata arbusculiformia *Centropogonem* subsect. *Brevilimbato* (praecipue *C. acrodentatum* et *C. alatum*) simulans sed ovarii apice conico et floribus in racemo terminali subumbellato, ergo in *Siphocampylum* gregem *Umbellatos* disposita; in hoc grege *S. reticulato* et *S. moritziano* affinis, sed ab his speciebus trichomatibus arbusculiformibus in caule foliis inflorescentia corollaque, calycis lobis triangularis erectis 3–4 mm longis, filamentorum tubo minute puberulo, et antherarum tubo apicem versus hirto statim distinguenda. Ab omnibus caeteris speciebus *Siphocampyli* cum trichomatibus arbusculiformibus racemo terminali subumbellato differt.

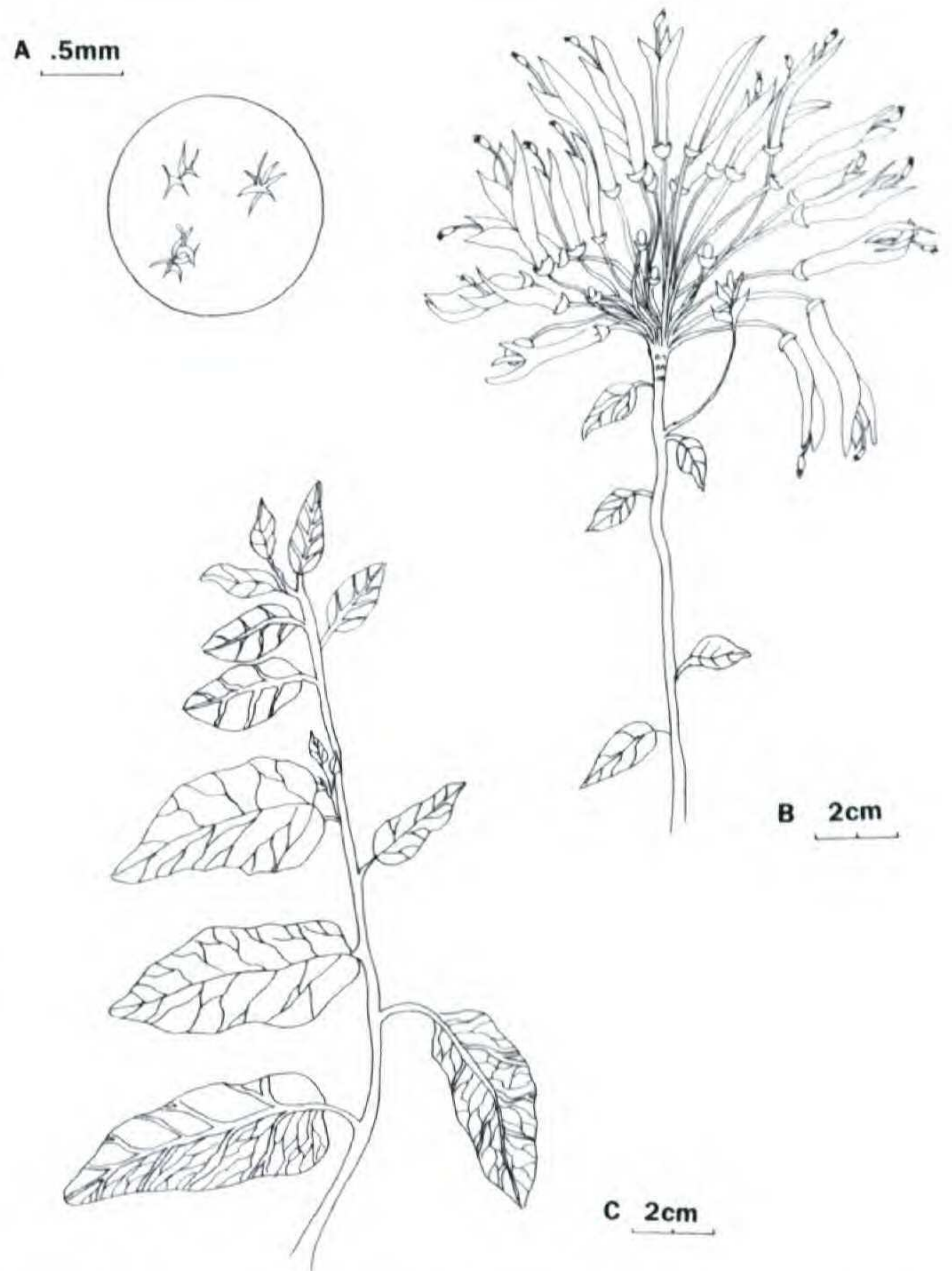


Figure 17. *Siphocampylus praevaricator* Lammers. —A. Arbusculiform trichomes on abaxial leaf surface. —B. Upper portion of fertile stem. —C. Upper portion of sterile stem. (Drawn from the holotype, *Luteyn et al. 5408*.)

Suffrutescent herb; stems scandent, moderately leafy, 2–2.5 mm diam., densely pubescent with arbusculiform trichomes; latex white. Lamina ovate or narrowly ovate, 4.5–6.5 × 2.8–3.5 cm, coriaceous, those on the stem below the inflorescence smaller; adaxial surface shiny olive green, glabrous or with a few arbusculiform hairs along the midrib; abaxial surface dull ochreous, densely pubescent with arbusculiform trichomes; margin irregularly dentate with smaller and larger teeth alternating; apex acute or acuminate; base cordate; petiole 14–18 mm long, 1.3–1.5 mm diam., 1/3–1/4 as long as the lamina, sparsely pubescent with arbusculiform trichomes. Flowers 30 to 35 in a terminal subumbellate raceme; rachis congested, condensed, 25 mm long; bracts linear, 4–6 × 0.2–0.3 mm, the apex acuminate; pedicels straight or somewhat curved, ascending, 22–27 mm long, 0.7–1 mm diam., ebracteolate, densely pubescent with arbusculiform trichomes. Hypanthium turbinate, 5 mm long, 5 mm diam., 1/8–1/10 as long as the corolla, densely pubescent with arbusculiform trichomes. Calyx lobes triangular, erect, 3–4 × 1.5–2 mm, 3/5–4/5 as long as the hypanthium, 1/8–1/10 as long as the corolla tube, densely pubescent with arbusculiform trichomes; apex acuminate; margin

entire. Corolla bilabiate, deep violet outside, paler within, 42–47 mm long, moderately pubescent with arbusculiform trichomes; tube suberect, 30–34 mm long, 4.5–4.8 mm diam. at base, abruptly narrowing to an isthmus 2.2–2.3 mm diam. just above base, then gradually expanding to 6.7–7.5 mm diam. at mouth; dorsal lobes narrowly triangular, erect, 12–13 × 2.3–3.5 mm, 2/5 as long as the tube, the apex acuminate; ventral lobes narrowly triangular, spreading, 7–10 × 2–2.8 mm, the apex acuminate. Staminal column exerted between the dorsal lobes; filament tube suberect, pale violet, 43–45 mm long, 0.7–1 mm diam., minutely puberulous; anther tube gray, 2–2.2 mm diam., suberect, sparsely pubescent with straight simple white hairs; dorsal anthers 6 mm long, 1/7–1/8 as long as the filament tube; ventral anthers 4.5–5 mm long, their apex pubescent with tufts of stiff white hairs 0.8–1 mm long. Fruit and seeds not seen, but apex of ovary conic.

Distribution, habitat, and phenology. Apparently endemic to western Venezuela and known only from the type collection.

Etymology. The specific epithet is the Latin noun *praevaricator*, one who speaks or behaves in a deceitful, ambiguous, or equivocal fashion. While the new species belongs to *Siphocampylus*, its arbusculiform trichomes might mislead one into assuming that it is a member of *Centropogon*.

Relationships. As noted under *Burmeistera arbusculifera*, arbusculiform hairs are common in *Centropogon* but very rare in other genera of Lobelioideae. Just three species of *Siphocampylus* have been reported to bear such trichomes (McVaugh, 1949; Lammers, 1998a): *S. columnae* (L. f.) G. Don and *S. furax* F. E. Wimmer of northern Ecuador, and *S. fallax* Lammers of northern Peru. All are referable to *Siphocampylus* sect. *Siphocampylus*, subsect. *Siphocampylus*, grex *Dissitiflori*, a group that is characterized in part by flowers solitary in the upper leaf axils (Wimmer, 1953). *Siphocampylus praevaricator*, on the other hand, bears its flowers in a congested terminal subumbellate raceme, and so is referable to a different element of subsection *Siphocampylus*, grex *Umbellati* (described above under *S. ambivalens*).

In Wimmer's (1953) treatment of *Siphocampylus* grex *Umbellati*, *S. praevaricator* would key with difficulty to *S. moritzianus* and *S. reticulatus*. Both these species are endemic to Venezuela and occur in Mérida; the former species is endemic to that state, the latter more widely distributed. However, these species differ from *S. praevaricator* in their simple (vs. arbusculiform) trichomes on stems, leaves, and inflorescences; filiform or sublinear (vs.

triangular) calyx lobes which are longer (6–10 mm vs. 3–4 mm) in *S. reticulatus* and recurved at apex (vs. erect) in *S. moritzianus*; glabrous (vs. minutely puberulent) filaments; and glabrous (vs. pubescent) anther tubes.

Because arbusculiform hairs are so much more common in *Centropogon* than in *Siphocampylus*, one must consider the possibility that this anomalous *Siphocampylus* has been described already as a species of *Centropogon*. An author who did not have mature fruit or did not dissect a flower to examine the ovary might well be led to assign this plant to *Centropogon*. The two genera clearly are closely related (Pepper et al., 1997; Lammers, 1998a; Buss et al., 2001), and there are many examples of species of one genus being described under the other.

Siphocampylus praevaricator does indeed show some resemblance in general size and shape of the leaves and flowers to two species of *Centropogon* subsect. *Brevilimbati* endemic to high-elevation páramo habitats in Mérida: *C. acrodentatus* F. E. Wimmer and *C. alatus* Gleason. However, both these species (as well as all other species of subsect. *Brevilimbati*) bear solitary axillary flowers rather than terminal subumbellate racemes. Furthermore, these two species of *Centropogon* have longer pedicels (8 cm in *C. acrodentatus*, 5–6 cm in *C. alatus*, vs. 2.2–2.7 cm in *S. praevaricator*), which are bibracteolate toward the base (vs. ebracteolate). Thus it does not appear that *S. praevaricator* has been described already under the genus *Centropogon*.

One last hypothesis to consider is that *S. praevaricator*, with the terminal subumbellate raceme characteristic of *Siphocampylus* grex *Umbellati* and the arbusculiform hairs characteristic of *Centropogon* subsect. *Brevilimbati*, is the result of hybridization between *S. moritzianus* or *S. reticulatus* on the one hand and *C. acrodentatus* or *C. alatus* on the other. The co-occurrence of all four species in Mérida certainly makes this possibility tempting. However, this seems unlikely. Neither of the salient characters of *S. praevaricator* is intermediate between the hypothesized parents. The inflorescence is as tight and congested as that of any member of *Siphocampylus* grex *Umbellati*, with highly reduced bracts; there is no tendency whatsoever toward the production of flowers in the axils of unreduced foliage leaves. Similarly, the hairs are fully as dense and arbusculiform as any member of subsection *Brevilimbati*, showing no tendency toward reduction in branching or density. It thus seems best to hypothesize that in *S. praevaricator*, the presence of these unusual trichomes is not due to gene flow

from a species of *Centropogon* but rather is the result of yet another independent evolutionary origin of these structures.

ADDENDUM

In addition to the new species described here, the 400 specimens of neotropical Lobelioideae identified over the past four years have included some additional collections of species described as new in a previous paper (Lammers, 1998a), most of which were based solely on the type gathering.

Burmeistera racemiflora Lammers, *Brittonia* 50: 258. 1998.

COLOMBIA. **Nariño:** en la vía Tumaco–Pasto, km 105, a 7 km de el Diviso, 850 m, en bosque, 12 June 1986, *H. León & P. Maas 1622* (U). The species was described solely from the type, collected in Carchi, Ecuador. This second collection, made five years earlier, extends the species' range across the border into adjacent Colombia.

Centropogon diana Lammers, *Brittonia* 50: 257. 1998.

PERU. **Cuzco:** kms. 143–152, Ollantaytambo–Alfamayo Rd., 58–67 km NW of Ollantaytambo, 3110–3415 m, montane cloud forest, infrequent, 11 Dec. 1978, *J. L. Luteyn & M. Lebrón-Luteyn 6456* (F). The species was described solely on the basis of the type. This second gathering was collected five years earlier in the same general region.

Centropogon jeppesenii Lammers, *Brittonia* 50: 252. 1998.

ECUADOR. **Napo:** trail to La Bonita ca. 1–2 km from end of Tulcán–Sta. Bárbara rd., ca. 25 km below Sta. Bárbara, 2100–2150 m, 0°35'N, 77°30'W, cloud forest & clearings above Río Chingual, 28 May 1985, *B. A. Stein 2871* (MO). The species was described solely on the basis of the type gathering. This second collection was made three years later at or near the type locality.

Siphocampylus smilax Lammers, *Brittonia* 50: 240. 1998.

BOLIVIA. **Santa Cruz:** Prov. Ichilo, Parque Nacional Amboró, ca. 15 km (SE) up the Río Pitasama from the Río Surutú, moist tropical forest on lower montane slopes, sandstone, 700 m, 17°44'S, 63°40'W, 26 Aug 1985, *J. C. Solomon & S. Urcullo 14074* (MO). This collection extends the species' distribution to a fourth province in Depto. Santa Cruz; it was previously reported from localities in Prov. Andrés Banez, Cordillera, and Florida.

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